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EDITED BY

WILLIAM EAGLE CLARKE, LL.D., F.R.S.E., ETC.
Keeper, Natural History Department, Royal Scottish Museum

WILLIAM EVANS, F.R.S.E., ETC.
Member of the British Ornithologists' Union

PERCY H. GRIMSHAW, F.R.S.E., F.E.S.
Assistant-Keeper, Natural History Department, Royal Scottish Museum

ASSISTED BY

EVELYN V. BAXTER, H.M.B.O.U.
LEONORA J. RINTOUL, H.M.B.O.U.
H. S. GLADSTONE, M.A., F.R.S.E., F.Z.S.
JAMES RITCHIE, M.A., D.Sc.
A. LANDSBOROUGH THOMSON, M.A., M.B.O.U.

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In Memoriam

GEORGE STOUT.

IT is with deep regret that we record the death of George Stout, who was known to our readers and to many ornithologists through the excellent work he accomplished as bird-watcher at Fair Isle. Shortly after the war broke out he responded to his country's call for men, and having joined the Royal Army Medical Corps, fell mortally wounded during the recent fighting on the Somme, and died in hospital on 13th November 1916. George Stout was in several respects a remarkable individuality. The writer became acquainted with him at Fair Isle in the autumn of 1905. George was then sixteen years old, and assisted his father, a crofter-fisherman. Youths who have been brought up in the remotest of our isles rarely show any predilection for natural history, but the subject of this notice was an enthusiastic devotee, and only required the chance to become a skilled naturalist. Thanks to his own excellent qualities of character, coupled with his great intelligence, the opportunity was not long in coming. His abilities were recognised and appreciated. He was supplied with books and binocular glasses, and these, together with a few weeks' training in the autumns of 1905 and 1906, equipped this apt pupil for the duties of bird-watcher at this now famous ornithological observatory—a post which he filled with marked

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success for several years. In 1909 Stout left his native island for the first time, and proceeded to Glasgow to enter the establishment of Mr Charles Kirk, the talented taxidermist, in whose employ he advanced rapidly as a skilled workman until the call for voluntary military service claimed him. He accompanied the writer to Fair Isle in 1909 and 1912, to St Kilda in 1910 and 1911, to Auskerry (Orkney) in 1913, and, alas, finally to the Butt of Lewis in 1914. The ten years' experience gained at these great observing stations resulted in Stout's becoming an accomplished field ornithologist, well versed in the peculiarities of the flight and call-notes of migratory birds, especially of the rarer species of passerines, and he was the means of adding the Red-rumped Swallow and the Eastern Short-toed Lark to the British avifauna. George Stout was a man of irreproachable character, amiable in disposition, and indefatigable in the pursuit of nature-knowledge. His loss at the early age of twenty-seven will be greatly deplored by all who knew him. W. E. C.

WILLIAM TULLOCH.

By the death of William Tulloch, Scottish Ornithology has lost one of the band of lightkeepers who render it such valuable service. His outstanding ornithological achievement was the capture of the first recorded specimen of the Rustic Bunting in Scotland, this bird appearing at Cape Wrath Lighthouse on 11th May 1906 (*Annals Scot. Nat. Hist.*, 1906, p. 138). Besides this, he kept notes for many years for the *Report on Scottish Ornithology*, and his carefully kept records helped much in the compilation of these Reports. William Tulloch came of a much respected family; his father was a Principal Lightkeeper, and his brothers-in-law too are in the Lighthouse Service. He was a man of a kindly disposition and of considerable intellectual ability, and at the time that ill-health compelled him to retire was Principal Lightkeeper at Ardnamurchan Lighthouse.

L. J. R. and E. V. B.

AUTUMN MIGRATION AT LITTLE ROSS LIGHTHOUSE, KIRKCUDBRIGHTSHIRE.

By William Begg.

Summer with its genial glow has fled, so also have the summer birds; the woods are vacant, the hedgerows deserted; the orchard where once were life and song is now all quietness, not a chirrup nor a twitter is now heard. The time has arrived, the instinct gifted by Nature tells the birds, that they must leave this northern clime and seek their southern winter quarters. The geographical position of the island of Little Ross renders it among the most favoured stations in Scotland for observing the departure in autumn of our own breeding birds; with these, migration begins very early—as soon as the middle of August. Amongst the commonest migrants at this time are Willow-warblers, Whitethroats, Spotted Flycatchers, Garden-warblers, Sedge-warblers, Robins, and Corncrakes. I sent the Robins that were killed at the lantern for inspection, and they proved to be of the British race, so were evidently our own birds going south. One might raise the question, why do they migrate so early? It can't be for want of food: insect life is abundant for insect-eaters, and seeds of all kinds plentiful for seed-eaters. Their migration flight takes place when the weather is still warm and genial, therefore it cannot be cold nor want of food which prompts this early departure. Another of our earliest migrants is the Swallow: it is a traveller by day. In all my service in the lighthouses, which is now thirty-two years, I have never seen a Swallow amongst other birds at the lanterns, but during the day they rest here in thousands; they care not whether the winds are strong or light, weather conditions don't seem to matter; they go on their long flight, feeding as they fly, towards their southern clime.

After these early movements migration goes on steadily throughout September and October and into November; in the first-named month all the above-mentioned species, as well as Chiffchaffs, Redstarts, Thrushes, and many others, are common at the lantern on suitable nights. All the Thrushes

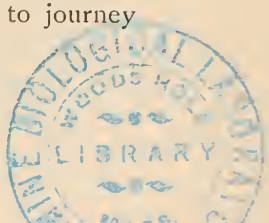
got early in the season belonged to the British race, though one that I got in November 1916 (and doubtless many others in the big rushes late in the season) was of Continental origin. This species is always very numerous on suitable nights: sometimes they darken the rays, and the death-roll is often enormous.

From the end of September onwards, Redwings are nightly visitors, and when weather conditions are suitable, they, like the Thrush, are very numerous, and the death-rate is always large: the court below, the tops of the flat roofs, and all round about, are literally strewn with the dead. Then come the scavengers: Kestrels and Gulls appear and make a clean sweep, the Gulls picking them up as a hen picks corn. Fieldfares and Blackbirds too are very numerous on migration, and many are killed at the light. This season has been a record here for Ring-ouzels; as many as fourteen have been counted sitting round the lantern at a time, whereas for previous seasons just an occasional visitor would be recorded. Missel-thrushes I find erratic in their movements—one night very numerous, then on the following night only a few; again, several nights pass and only an occasional one will be seen, then a big rush may occur and many will be killed.

Finches and Linnets gather here for a day or two in great flocks, then proceed in undulating flights to the south: they are daylight travellers, and prefer a light easterly wind and clear atmosphere. The Grey, Pied, and White Wagtails travel principally by day; their movements and those of the Wheatear were stronger this autumn than I have ever seen. The Wheatear seems to me to travel both by day and night, I have seen them passing in great numbers over the island on a southern course during the day, and at night in numbers round the lantern. Robins and Wrens have been unusually plentiful on migration this autumn, being regular visitors to the lantern, and up to the time of writing (mid-November) a great many Wrens are still on the island. An interesting visitor came during the third week of November this year, namely, a Wryneck, which struck the lantern and was killed; it seems a late date for this species to occur so far north. Golden Plover and Lapwings are at times very numerous;

being large birds, they show up prominently in the rays, also they are heavy, and when they strike are instantly killed. One night I was standing out on the balcony right among them, when one struck me on the side of the face and left me fairly dizzy for some time. After a big migration night I have picked up in the court below and round about the tower as many as thirty-six Golden Plover, the wounded, too, are thickly scattered over the island. The mortality among the Lapwings is even greater, we collect them, and have stews and pies, but even so, many have to be buried or given to the Gulls. Skylarks and Starlings also pay heavy toll at the lantern. The former appear as soon as the end of August, and strong rushes take place in September and October, a larger percentage of Larks is killed than of any other bird. Starlings we have at all times; every hazy night brings some to the lantern, but during October the great migration rushes of this species are a feature of the nights. Besides these migrant Starlings, we have many residents, the caves and fissures amongst the rocks are full of them roosting at night. They are very reliable weather prophets, leaving these roosting quarters when a change is going to take place. It is wonderful what an attraction the light has to most land-birds, yet there are others which it never affects. The Rock-pipit, for instance, though locally very numerous, rarely appears at the light, and the same may be said of Owls and Hawks (Peregrine, Kestrel, and Sparrow-hawk): these, though resident in the district, rarely visit the lantern, and then only in search of food. Curlew I have caught in the light-room, having on some nights to leave the door from the light-room out to the balcony open, owing to condensation: these birds walk straight in, and make no attempt to fly.

It is a wonderful sight, standing on the balcony on a big migration night, with the revolving rays above one's head and these myriads of birds flying and screaming about the lantern. As I stand there I conjecture the distance these feathered mites have travelled before they reached here, and the yet greater distance many of them will have to journey before they reach their destination.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Common Shrew in Raasay.—When on Raasay from the middle of June to the middle of August 1916, I several times found dead Shrews lying on the roads at the south end of the island. I sent one to Dr Eagle Clarke, who identified it as *Sorex araneus castaneus*, Jennings. Few specimens of the Common Shrew have been examined from the Western Islands, so this record may be of interest. Millais, in his *Mammals of Great Britain and Ireland*, vol. i. p. 143, says: "The record of this species for Iona is an error; for in all the Outer and Inner Hebrides, as well as in Skye, the Lesser Shrew takes its place."

The authors of the *Fauna of Argyll and the Inner Hebrides*, p. 8, also doubt the presence of the Common Shrew in Iona, which rests on a statement of H. D. Graham, 1852-67. On the other hand, specimens of the Common Shrew have been obtained in Islay, and it is recorded from Mull by Mr D. MacDonald (*Annals Scot. Nat. Hist.*, 1904, p. 186). One Shrew, which I saw on Raasay but unfortunately did not preserve, was very small, and may have been a Lesser Shrew, but the others were without doubt the same as the one sent to Dr Eagle Clarke.—Jean Helen Gaskell, Lahill.

Red-breasted Flycatcher and Black Redstart on the Isle of May.—Seeing Mr John Bain's records of these species in Orkney this autumn, I think it may be of interest to mention that they occurred here about the same time. The Red-breasted Flycatcher (*Muscicapa parva parva*) put in its appearance on the 28th September. The wind was easterly and had been so for some days previously, and there were a good many migrants on the island. Exactly a month later, viz., on 28th October, a Black Redstart (*Phœnicurus ochrurus gibraltariensis*) visited us. This species occurs almost every spring and autumn on the Isle of May, but always in small numbers.—Sim Baigrie, Isle of May Lighthouse.

Lapwing's Unusual Nesting Site.—In June 1916, at Williamwood, Cathcart, a Lapwing's nest containing four eggs was situated only four and a quarter yards from the nearest rail of the Ardrossan line. Notwithstanding that some fifty or sixty trains pass along this railway daily during six days of the week, and a few on Sundays, the eggs were duly hatched out, though one of the young was a weakling and died before it was able to leave the nest.—John Robertson, Glasgow.

THE STEWARTRY OF KIRKCUDBRIGHT AND ITS INLAND MOLLUSCAN FAUNA.

By W. Denison Roebuck, M.Sc., F.L.S.

Kirkcudbrightshire—or the Stewartry—or East Galloway, with about 900 square miles of area and a semicircular coast-line of 45 miles in extent upon the Solway Firth, includes a natural area, of the basins of the Urr, the Dee, and the Fleet, and parts of those of Nith and Cree. In elevation it rises to 2764 feet at Mount Merrick, and its northern portion is mainly moorland and hill-pasture, the southern being under cultivation. Most of the molluscan collecting has been done in the lowland region, from Maxwelltown to Dalbeattie, Castle Douglas and Kirkcudbright, and the result has been a not inconsiderable enumeration of species.

The very considerable number of records included in this paper is the work of comparatively few observers. About 1884 and following years large numbers of records were contributed by Mr Fred. R. Coles, collected in the valleys of the Tarff and the Dee, close to Kirkcudbright, and several about the same time and place by Mr William Thomson.

About 1877, 1880, 1889, 1890, and 1893, Mr Richard Rimmer, the author of one of the standard manuals of British land and freshwater Mollusca, was in residence at Dalawoodie, in Dumfriesshire, from whence, as a centre, he investigated the valley of the Clouden [or Cluden], which here divides the county of Dumfries from the Stewartry of Kirkcudbright. It is to his assiduity and research that we owe much of our knowledge of the smaller species, and his especial acquaintance with the species of the genus *Vertigo*, to which he paid a good deal of attention, has materially enriched our lists for the two counties. As will be seen in the list, the specimens upon which the Rimmer records are based are now in the Royal Scottish Museum, Edinburgh.

In 1890 my friend Mr William Evans, with a view to render more complete my "Census" of Scottish Mollusca, then

being written, sent a number of species which he collected about Castle Douglas and Maxwelltown; and about the same time I received a number of slugs from the latter place from Mr Robert Service, a naturalist to whom southern Scotland owes much. About 1895 the Rev. G. A. Frank Knight collected a few species at Gatehouse of Fleet.

A single record—of *Acanthinula lamellata*—about 1890 was from the Rev. John M'Murtrie.

In 1903 my friend Miss M. V. Lebour, of the Leeds University, collected a few good things at Dalbeattie, and she is the only observer who has taken *Vertigo substriata* and *Acicula lineata* in this county; while in 1907 the Rev. R. Godfrey sent a number of records from Kippford, near Dalbeattie.

In 1912 my old friend Mr Edward Collier, of Manchester, sent a number of slugs and snails from Creetown, on the western border, a locality which he has been the only one to collect in; and in the same year the Rev. W. H. Daubney, of Bury St Edmunds, who is not a malacologist, sent me a few slugs from Maxwelltown, on the eastern border.

As to the literature of the subject, I am not aware that any list has ever been published, except in my own "Census of Scottish Land and Freshwater Mollusca," in the *Proceedings of the Royal Physical Society of Edinburgh* for 1889-1890, vol. x., 1891, pp. 437-503, in which I gave localities for fifty-three species.

This was supplemented by notes as follows:—*Limax flavus* [and *L. maximus*] in Kirkcudbrightshire (*Ann. Scot. Nat. Hist.*, April 1892, p. 105); and Kirkcudbrightshire Limnææ (*op. cit.*, July 1895, p. 152).

The following casual notes were published in the old *Scottish Naturalist*:—F. Buchanan White and R. Wood on *Bythinia tentaculata* m. *decollatum* (*Scot. Nat.*, 1874, ii. 274); and R. Rimmer on the occurrence of *Vertigo pusilla* and three other species (*Scot. Nat.*, 1881, vi. 61); while Dr F. Buchanan White's important "List of Scottish Land and Freshwater Mollusca" (*Scot. Nat.*, 1873, vol. ii.) contains Kirkcudbrightshire records on pp. 167, 205, 207, 209.

A note by Mr R. Rimmer records *Helix lamellata*

(*Quarterly Journal of Conchology*, November 1877, i. 265); and the same writer in his book on British Mollusca of 1880 has a note at p. 3.

The list which follows is an "authenticated" one, compiled entirely from the Record-books of the Conchological Society, every specimen recorded having been seen by Mr John W. Taylor, M.Sc., the Referee, and in the case of the slugs by myself, as limacological Referee.

Testacella haliotidea.

Maxwelltown, in Corberry Nursery Gardens, April 1890 (Robert Service).

Limax maximus.

Near Maxwelltown, 13th September 1890 (Wm. Evans); Maxwelltown, one, small, var. *ferussaci*, in his house, 19th July 1891 (Robert Service).

Limax flavus.

Maxwelltown, in cellars, common, one nearly adult sent 20th July 1891 (Robert Service).

Limax arborum.

New Abbey, 5th September 1912, one, adult (Rev. W. H. Daubney).

Agriolimax agrestis.

Near Maxwelltown, 13th September 1890, var. *reticulata*, one, immature (Wm. Evans); Maxwelltown, 5th and 6th September 1912, var. *reticulata*, two adults (Rev. W. H. Daubney).

Milax gagates.

Maxwelltown, one, 15th March 1897 (Robert Service). This is the specimen recorded for "Dumfries" in Mr J. W. Taylor's Monograph, vol. ii., page 148.

Arion ater.

Near Maxwelltown, 13th September 1890, typical, one adult and one immature (Wm. Evans); Castle Douglas, same date, one adult (*id.*).

Arion subfuscus.

Castle Douglas, 13th September 1890, one, small (Wm. Evans); Creetown, 28th May 1912, one, small, var. *aurantiaca* (Edward Collier).

Arion hortensis.

Maxwelltown, September 1890 (Wm. Evans); Maxwelltown, 5th and 6th September 1912, two, adult (W. H. Daubney).

Arion circumscriptus.

Near Maxwelltown, 13th September 1890, one, very young (Wm. Evans); Creetown, 28th May 1912, two, small (Edward Collier).

Arion intermedius.

Creetown, 28th May 1912, one, extremely young (Edward Collier).

Vitrina pellucida.

Carlingwark Loch, 1880, two, young (R. Rimmer; Roy. Scot. Mus., Edinburgh); Castle Douglas, September 1890 (Wm. Evans).

Hyalinia cellaria.

Close to Kirkcudbright, two, collected by Wm. Thomson, 23rd March 1884 (Fred. R. Coles); Tongland Hill, several, February 1884 (*id.*); Tarffside and hill, etc., a few, 23rd February 1884 (*id.*); Glen Burn, just above the mill, under stones, 19th August 1890, several type, juv., and one var. *scharffii* (R. Rimmer; Roy. Scot. Mus., Edinburgh, May 1913); Mabie Marthroun, 8th May 1889, two (*id.*); Mabie, in Lochaber Wood, July 1884, two (*id.*); Terregles, two (*id.*); Castle Douglas, September 1890 (Wm. Evans); Maxwelltown, same date (*id.*).

Hyalinia alliaria.

Shambellie, a few (R. Rimmer; Roy. Scot. Mus., Edinburgh, May 1913); Mabie Marthroun, 8th May 1889, two (*id.*); Castle Douglas, September 1890 (Wm. Evans); Kippford, Dalbeattie, January 1907 (R. Godfrey).

Hyalinia nitidula.

Dee, Tongland, December 1883 (Fred. R. Coles); Tongland Hill, a few, February 1884 (*id.*); Skirney, etc., a few, February 1884 (*id.*); Tongland (*id.*); Skesney, Tarffside (*id.*, February 1885); Mabie Marthroun, 8th May 1889, a few (R. Rimmer; Roy. Scot. Mus., Edinburgh); Castle Douglas (Wm. Evans, September 1890); Kippford, Dalbeattie, January 1907 (R. Godfrey).

Hyalinia pura.

Tongland, one, var. *margaritacea* (Fred. R. Coles, 22nd March 1884); Mabie Marthroun, 8th May 1889, var. *margaritacea*, one (R. Rimmer; Roy. Scot. Mus., Edinburgh).

Hyalinia radiatula.

Mabie Marthroun, 8th May 1889, one (R. Rimmer; Roy. Scot. Mus.); Oswald's Wood, adjoining Woodlands, 21st June 1890, one (*id.*); Shambellie, a few (*id.*).

Hyalinia crystallina.

Tongland, four (Fred. R. Coles, 22nd March 1884); Twynholm, banks of Tarff, under stones in woods, 27th February 1884, several (*id.*); banks of Tarff, a few (*id.*, February 1885); Mabie, on fallen beech-leaves, May 1889, one, var. *contracta* (R. Rimmer; Roy. Scot. Mus., Edinburgh); Shambellie, a few (*id.*); Mabie Woods, May 1889, a few (*id.*); Mabie, in Lochaber Wood, July 1889, two (*id.*); Castle Douglas, September 1890 (Wm. Evans); Kippford, Dalbeattie, January 1907 (R. Godfrey).

Hyalinia fulva.

Mabie Woods, May 1889, one (R. Rimmer; Roy. Scot. Mus., May 1913); the Glen, Cargen Burn, September 1889, under stones, a few (*id.*); Glen Burn, just above the mill, under stones, 19th August 1890, two (*id.*); Shambellie, several (*id.*); Glen Burn, September 1890, several (*id.*); Douglas Hall, one (*id.*); Castle Douglas, September 1890 (Wm. Evans); Kippford, Dalbeattie, January 1907 (R. Godfrey).

Zonitoides nitidus.

Loch End, near to Douglas Hall, August 1880, one, young (R. Rimmer; Roy. Scot. Mus., Edinburgh); Terregles, one (*id.*); the Glen, Cargen Burn, September 1889, under stones, one (*id.*); Creetown, 25th May 1912 (Edward Collier).

Zonitoides excavatus.

Shambellie, one (R. Rimmer; Roy. Scot. Mus., Edinburgh, May 1913); Kippford, Dalbeattie, January 1907 (Rev. R. Godfrey).

Punctum pygmæum.

Near Castle Douglas, September 1890 (Wm. Evans); Kippford, Dalbeattie, January 1907 (Rev. R. Godfrey).

Pyramidula rotundata.

Dee, Tongland, December 1882, numerous (Fred. R. Coles); Tongland Hill and Tarff banks, numerous, 23rd February 1884 (*id.*); High Boreland, 26th February 1884, three (*id.*); Tarff bank, Twynholm, 27th February 1884, three (*id.*); Glen Burn, just above the mill, under stones, 19th August 1890, one (R. Rimmer; Roy. Scot. Mus., Edinburgh); Shambellie, one (*id.*); Castle Douglas and Maxwelltown, September 1890 (Wm. Evans); Kippford, Dalbeattie, January 1907 (R. Godfrey).

Acanthinula aculeata.

Glen Burn, near Dumfries, a fragment (R. Rimmer; Roy. Scot Mus., Edinburgh, May 1913); Mabie Woods, May 1889, one (*id.*); Shambellie, several (*id.*); Mabie, on fallen beech-leaves, near an old ash-tree, one (Miss M. Henriette Rimmer; Roy.

Scot. Mus., Edinburgh, May 1913): near Castle Douglas, September 1890 (Wm. Evans).

Acanthinula lamellata.

Shambellie, several (R. Rimmer; Roy. Scot. Mus., Edinburgh, May 1913); Mabie Woods, May 1889, a few (*id.*); New Abbey (Rev. John M'Murtrie, before 1890).

Helix aspersa.

Close to Kirkcudbright, a few, juv., collected by Wm. Thomson (Fred. R. Coles, 22nd March 1884).

Helix nemoralis.

Dee, Tongland, two, young, December 1882 (Fred. R. Coles); Kirkcudbright, collected by Wm. Thomson, one *rubella* 00000, two var. *libellula* 12345, one of them becoming (123)(45) at the mouth, one var. *libellula* (12)3(45), becoming (12345) at mouth, and one var. *libellula* (12)3(45) *bimarginata*, all adults (Fred. R. Coles, March 1884); Castle Douglas, 13th September 1890, fragment of adult var. *rubella* 00300 (Wm. Evans).

Helix hortensis.

Close to Kirkcudbright, collected by Wm. Thomson, seven var. *lutea* 00000, eight var. *lutea* 12345, one of them becoming 1(23)45 at mouth, seven var. *lutea* 1(23)45, of which one becomes (12345) and two 1(2345) at mouth, one var. *lutea* 1(234)5, which becomes (12345) at mouth, two var. *lutea* (123)(45), both of which become (12345) at mouth, two var. *lutea* (12345), all adults (Fred. R. Coles, March 1884); Castle Douglas, 13th September 1890, one adult var. *lutea* 00000, and one immature var. *lutea* 12345 (Wm. Evans); Maxwelltown, same date, one young var. *lutea* 12345 (*id.*).

Helicigona arbustorum.

Mabie, Richard Rimmer, one (Roy. Scot. Mus., Edinburgh, May 1913).

(*To be continued.*)

Vanessa antiopa in Scotland.—In the *Entomologist* for August 1916 (pp. 188-189) W. A. R. Jex Long reports having seen, at close quarters, an example of the "Camberwell Beauty" butterfly at Bearsden, near Glasgow, on 29th April last. The specimen, which was white-bordered, settled on a brick which was lying in a field, and allowed of a close inspection, though too wary to be captured. The fore-wings were worn in parts, but otherwise the colouring was rich and good.

THE BRITISH LICE (*ANOPLURA*) AND THEIR HOSTS.[1]

Compiled by PERCY H. GRIMSHAW, F.R.S.E., F.E.S.

STUDENTS of the Anoplura will welcome the recently-published Catalogue of G. F. Ferris, for it brings the classification of this interesting group of parasitic insects up to date, and includes all known species, while at the same time a systematic host list is given which enables anyone at a glance to ascertain what anoplurid lice have been recorded from any particular species of mammal. A summary of this paper, modified so as to include only the British species, or rather such species of Anoplura as have been observed infesting mammals which occur in Britain, may perhaps be of service to certain of our readers, especially those who have not ready access to Ferris's paper.

At the outset, it is interesting to note that since the publication of Denny's "Monographia Anoplurorum Britanniæ" in 1842 only a single species has been added to the British list, viz., *Linognathus ovillus* (Neumann), which was recorded by W. Evans in the *Proc. Royal Physical Society of Edinburgh*, vol. xix., p. 94 (1913). Among the species of Anoplura included in the following list are four which have not yet (so far as we are aware) been found in this country, but which may reasonably be expected to occur, inasmuch as their recorded hosts are members of the British fauna. Such are *Hoplopleura longula* (Neumann) and *Polyplax gracilis*, Fahrenholz, infesting the Harvest Mouse, *Micromys minutus; Polyplax reclinata*, Nitzsch, found on the Common Shrew, *Sorex araneus;* and *Antarctophthirius trichechi* (Boheman), occurring on the Walrus, *Odobænus rosmarus*. Since our Common Shrew is considered to belong to a sub-species peculiar to these islands, it would be of special interest to find an Anopluran parasite thereon, and to ascertain if it were identical with that above mentioned as infesting the continental forms of its host.

[1] Adapted from "A Catalogue and Host List of the Anoplura," by G. F. Ferris—*Proc. California Acad. of Sciences* (4), vol. vi., pp. 129-213 (May 1916).

Ferris's introductory remarks are of interest as indicating what progress has been made in the study of the Anoplura within comparatively few years. Previous to 1904 most of the species were included in the genus *Hæmatopinus*, and only one family was recognised. Now there are twenty-three genera, arranged in four families. The systematic position of the whole group has also been changed. Formerly they were treated as a sub-order of Hemiptera, but there is now every reason to believe that they are related to the Mallophaga or Bird-lice, and that they should, provisionally at least, be regarded as constituting a distinct order. The distribution of the Anoplura among their various hosts is strongly reminiscent of what occurs in the Mallophaga, for "the remarkable degree to which these parasites are broken up into natural groups that are strictly confined to closely related groups of hosts, is now clearly evident, while previously it was barely hinted at. The problem of their distribution is shown to be almost exclusively the problem of the genetic relationships of their hosts." Of the four families recognised one (Hæmatomyzidæ) contains only a single species confined to elephants; a second (Echinophthiriidæ) comprises forms which are found only on marine mammals; the third (Pediculidæ) includes the species which infest man, apes, and monkeys; while all the remaining forms are contained in the fourth family (Hæmatopinidæ).

The following key (adapted from that of Ferris) may assist in the determination of our British genera:—

1. Body thickly beset with more or less short, stout spines, or with spines and scales. Occurring exclusively on marine mammals. Fam. ECHINOPHTHIRIIDÆ . . 2
   Body with spines or hairs always in definite rows, never with scales. Occurring exclusively on land mammals 3

2. Thorax and abdomen bearing delicate scales. Antennæ five-segmented . Subfam. ANTARCTOPHTHIRIINÆ. Genus *Antarctophthirius*
   Thorax and abdomen without scales. Antennæ four-segmented . . Subfam. ECHINOPHTHIRIINÆ. Genus *Echinophthirius*

3. Eyes lacking. Fam. HÆMATOPINIDÆ . . . 5
Eyes present, well pigmented. Occurring on man. Fam. PEDICULIDÆ. Subfam. PEDICULINÆ . . . 4
4. Legs all of same size . . . Genus *Pediculus*
Anterior legs much smaller than others. Genus *Phthirius*
5. Legs and claws all practically of equal size
Subfam. HÆMATOPININÆ. Genus *Hæmatopinus*
Anterior legs smaller and with slenderer claw than the posterior pair, at least. Subfam. LINOGNATHINÆ . 6
6. Abdomen with well developed pleural plates . . 9
Abdomen entirely without pleural plates . . 7
7. Abdomen with more than one row of hairs or spines on each segment . . . Genus *Linognathus*
Abdomen with but one row of hairs on each segment . 8
8. Gonapods moderately long; behind each gonapod a stout, flat, spine-like process . . Genus *Cervophthirius*
Gonapods very short; no flat, spine-like process behind them . . . Genus *Hæmodipsus* (in part)
9. Anterior pair of legs equal to middle pair, both pairs very small, posterior pair large and stout Genus *Enderleinellus*
Anterior legs smaller than either middle or posterior legs, and with much smaller and more slender claw . 10
10. Abdominal segments with but a single transverse row of spines . . . Genus *Hæmodipsus* (in part)
Abdominal segments, at least in part, with two or more transverse rows of spines 11
11. Abdominal tergites and sternites with not more than two rows of hairs or spines . . Genus *Polyplax*
Abdominal tergites and sternites in part with three rows of hairs or spines . . . Genus *Hoplopleura*

Family PEDICULIDÆ.[1]

Antennæ five-segmented. Eyes present, distinctly pigmented. Legs fitted for climbing, the tibiæ with a thumb-like process opposing the claw. No pretarsal sclerite between tibia and tarsus. Parasitic upon man.

Subfamily PEDICULINÆ.

Characters of the Family.

[1] It must be clearly understood that the diagnoses given in the following list have been modified so as to apply to British forms only.

Genus *Pediculus* Linnæus.

Head short. Legs all of approximately the same size. Abdomen elongated. Spiracles small. Abdominal segments without lateral projections, and with numerous small spines.

1. *P. capitis* De Geer. From Man (*Homo sapiens*).
2. *P. corporis* De Geer. From Man (*Homo sapiens*).

Genus *Phthirius* Leach.

Anterior legs much smaller and with much slenderer claws than the others. Abdomen short and broad, the fifth to eighth segments with conical lateral processes. Spiracles large, those of the first three abdominal segments crowded close together.

3. *P. pubis* Linnæus. From Man (*Homo sapiens*).

Family HÆMATOPINIDÆ.

Eyes lacking. Antennæ five-segmented. Tibiæ with a thumb-like process opposing the claw.

Subfamily HÆMATOPININÆ.

Anterior legs of practically the size of the others. A triangular skeletal piece (pretarsal sclerite) present between tibia and tarsus.

Genus *Hæmatopinus* Leach.

Head with very sharp, forward-pointing temporal angles. Thorax broad. Legs all of practically the same size, with a strongly chitinized skeletal piece between tibia and tarsus. Abdomen with a swollen, pad-like, chitinized area on the lateral margins of the third to eighth segments. Tergites and sternites with a varying number of small chitinized plates. Each tergite and sternite with one transverse row of very small hairs.

Recorded from *Perissodactyla* and *Artiodactyla*.

4. *H. asini* (Linnæus). From Domestic Horse (*Equus caballus*) and Ass (*Equus asinus*). Var. *colorata* Piaget. From Domestic Ass (*Equus asinus*).
5. *H. eurysternus* (Nitzsch). From Domestic Cattle (*Bos taurus*).
6. *H. suis* (Linnæus). From Domestic Pig (*Sus scrofa domestica*).

Subfamily LINOGNATHINÆ.

Anterior legs always distinctly smaller and with much slenderer claw than the posterior. No skeletal piece (pretarsal sclerite) between tibia and tarsus.

Genus *Enderleinellus* Fahrenholz.

Anterior and middle pairs of legs of equal size, small and with slender claws. Posterior legs very large and stout, with stout claw. Head entirely without temporal angles. Abdomen with or without chitinized tergal and sternal plates. Abdominal segments for the most part with but one row of hairs or spines in both male and female. Third sternite usually with a widely separated pair of chitinized plates or areas, one near each lateral margin. Pleurites present on second to fifth or sixth segments.

7. *E. sphærocephalus* (Nitzsch). From Squirrel (*Sciurus vulgaris*).

Genus *Hæmodipsus* Enderlein.

Anterior legs small, with slender claw, middle and posterior legs larger, sub-equal, with heavier claws. Head broad, thorax very small. Abdomen entirely without chitinized tergites and sternites, each segment with a single transverse row of spines or hairs. Pleural plates very small or wanting. Gonapods very short.

Recorded only from *Leporidæ* (Rodentia).

8. *H. lyriocephalus* (Burm.). From Mountain Hare (*Lepus timidus*) and Brown Hare (*L. europæus*).
9. *H. ventricosus* (Denny). From Wild and Domestic Rabbit (*Oryctolagus cuniculus*).

Genus *Hoplopleura* Enderlein.

Antennæ similar in the sexes. Anterior legs small with slender claw; middle legs larger with stouter claw; posterior legs very stout with stout, heavy claw, and usually with a small, pointed protuberance on the anterior margin of the tibia. Female with most of the abdominal tergites divided into three transverse plates, each bearing a row of spines. Males with most of the abdominal tergites and sternites divided into two plates or undivided, but with some divided into three. Anterior division of the third sternite in both sexes with two pairs, or with two groups of three very stout and conspicuous spines. Pleural plates present.

From *Muridæ* (and ? *Soricidæ*).

10. *H. acanthopus* (Burm.). From Field Vole (*Microtus agrestis*), House-Mouse (*Mus musculus*), and ? Common Shrew (*Sorex araneus*).
11. *H. longula* (Neumann). From Harvest-Mouse (*Micromys minutus*).[1]

[1] Not yet recorded from Britain.

(*To be continued.*)

Striped Wrasse in Kerrera Sound.—A Striped Wrasse (*Labrus mixtus*) was caught in a net in the Sound of Kerrera opposite Gallanach House by my manager on the 3rd of October last. The fish being unknown to the taxidermist who mounted it, the specimen was sent to Dr Eagle Clarke, of the Royal Scottish Museum, for identification.—J. Patten Macdougall, Gallanach, Oban.

[Though this Wrasse is not to be regarded as a rare fish in Scottish seas, yet there appear to be only a few records of its occurrence on the West Coast. The localities for it, known to the Editors, are Ayr Bay, north coast of Mull, Loch Carron, Sound of Jura, North Uist, and East Loch Tarbert (Harris).—Eds.]

Limnobia bifasciata, Schrk., in Perthshire.—To the Scottish localities for this species given by Messrs Evans and Grimshaw (*Scot. Nat.*, 1916, p. 300), the Blairgowrie district of Perthshire may be added. I found the insect on marshy ground at one of the lochs near Blairgowrie in July 1912.—A. E. J. Carter, Monifieth.

BOOK NOTICE.

Insect Enemies. By C. A. Ealand, M.A. London: Grant Richards Ltd. 8vo, 223 pages, 53 figures. 1916. Price 6s. net.

The author of this useful little volume has already established a reputation as a successful writer on economic entomology, and his present effort supplies the general reader with an acceptable account, within a moderate compass, of most of the injurious insects, their habits and methods of control, which he is likely to come across in these islands. The subjects are arranged according to the nature of their depredations, beginning with forestry, and dealing successively with fruit trees, flowers, vegetables, farm crops, domestic animals, and the household and warehouse. The last chapter is devoted to insects and man, and then follow an appendix giving the methods of using the various insecticides recommended in the body of the work, and a bibliography sufficiently comprehensive for ordinary purposes. The style of the book is plain and straightforward, and on pp. 157 and 158 we find an amusing quotation from Mark Twain on the habits of ants. On p. 110, l. 5, *Prophila* should be *Piophila*, and again on p. 222 of the index.

SCOLYTIDS (INCLUDING *HYLASTES CUNICULARIUS* AND *PITYOPHTHORUS RAMULORUM*) AND OTHER COLEOPTERA (INCLUDING *METABLETUS TRUNCATELLUS*) TAKEN IN THE FORTH AREA.

By William Evans, F.R.S.E.

(*Concluded from* 1916, *page* 308.)

Foremost among the Anobiids is the common furniture beetle or "death-watch," *Anobium domesticum*, Fourc., which is still only too well known in many of the older houses throughout the district. I have obtained it, or had it reported from old chairs, chests, etc., in each of the three Lothians, Fife, Stirling, South Perth, and Clackmannan; and in April last a colony was found in the open, in a fence-post, at Kate's Mill, near Edinburgh. When staying at Aberlady and other villages during the summer and autumn months, I have often listened to their "ticking" during the still hours of the night, and several times observed numbers on the windows of the rooms in the daytime. The allied but much larger *Xestobium tessellatum*, F., which occasionally proves so destructive to the woodwork of churches and other buildings in England, is credited to Forth in Sharp's Scottish Catalogue, on what authority I do not know. So far, it has never come under my notice. *Priobium castaneum*, F., is fairly common, and no doubt widely distributed in old hawthorn hedges. In June 1900 I beat two off bushes on a roadside near Ormiston, East Lothian; and in April last, both adults and larvæ were taken from their galleries in dead hawthorn stems, and in a dead beech, at Saltoun in the same county. The species was also found last year in old hedges at Comiston and Kate's Mill (Edinburgh), and Gifford (Haddington).

Fences made of unbarked larch and pine frequently yield *Ernobius mollis*, L., in plenty. A number of years ago (November 1896) the larvæ were found in great abundance in larch bark on a recently erected rustic bridge over the

burn south of Blackford Hill, Edinburgh. From a score brought home, a series of the beetles was reared. My other localities for it are Polton, Balerno, Tyninghame (September 1894), Gullane (July 1898), Dechmont in Linlithgowshire (larvæ, April 1916), Stirling (1887), and Milnathort (Kinross). *Ptilinus pectinicornis*, L., I have met with for certain in only one locality, viz., Binning Wood, East Lothian, where I first found its neatly drilled holes in the bole of a dead beech in November 1909, and managed after considerable trouble—for the wood was very hard—to extract a few of the beetles (all dead females). On 2nd May 1914 a dozen males, known by their ample comb-like antennæ, were found under the bark of a dead hornbeam. Numerous borings, similar to those in the beech just mentioned, were observed in a dead poplar at Dollar last May; possibly they were also the work of this species.

No Lyctid occurs here so far as I am aware, except as a casual introduction in wood coming from a distance. In this manner *Lyctus brunneus*, Steph., recently made its appearance in one or two of the cases in the Royal Scottish Museum, Edinburgh. In August and September 1915 quite a number emerged there from wood used by a London taxidermist in mounting some foreign mammals.

This completes my list of bark and wood-boring species.

Other Coleoptera.

Of other Coleoptera taken in Forth during the past fourteen years, I have hundreds of records that might usefully be appended hereto did space permit. For the present, however, I must restrict myself to some of the more interesting. Attention may be directed to the discovery of *Metabletus truncatellus* on the Isle of May. The species was recorded in 1853 from "Cramond: Rev. W. Little," in Murray's *Coleoptera of Scotland;* but Sharp considered it doubtful as Scottish, a view which has been accepted by Fowler. The occurrence of *Magdalis pruni* at Bridge of Allan is also noteworthy, there being apparently no other Scottish record of this weevil, except the old one from "Dalmeny Park: Mr R. N. Greville," given by Murray.

Cicindela campestris, L. — One beetle and many larvæ seen on railway bank between Bogside (Fife) and Forest Mill (Clackmannan), 25th July 1903; Glen Burn, Lomonds (Kinross), several, 11th June 1904.

Dyschirius salinus, Schaum.—Saltmarsh, near Elie (Fife), several, May 1903, and again, June 1904.

Anchomenus angusticollis, F.—Common under bark on paling beside the Teith, Callander, April 1914; and under bark of old willow, beside the Devon, Dollar, May 1916.

Aëpus robinii, Lab.—Common under stones between tide marks, Longniddry (Haddington), July 1916.

Trechus micros, Herbst.—One on margin of Cocklemill Burn, near Elie, 4th June 1904; *T. rubens*, F.—One, Currie curling-pond, near Edinburgh, June 1906.

Metabletus truncatellus, L.—Isle of May, one taken in ants' nest under a stone south of the engineer's house, 18th September 1911, and another nearer the lighthouse in May 1913. The latter specimen has been shown to Prof. Hudson Beare who confirms the identification. *M. foveola*, Gyll., has been taken on the coasts of Fife and East Lothian, but not on the Isle of May.

Brychius elevatus, Panz.—In burn near Elie, June 1904.

Haliplus fluviatilis, Aubé—Kidlaw Reservoir, at foot of Lammermoors, July 1909. Determined by Mr F. Balfour-Browne.

Hydroporus ferrugineus, Steph.—Pond at South Queensferry, one, June 1905.

Agabus arcticus, Payk.—Loch Glow, Cleish Hills (Kinross), abundant, September 1909.

Helophorus affinis, Marsh.—Near Kirknewton (Midlothian), May 1901; Reservoir near Aberdour (Fife), May 1905: both specimens determined by Mr Balfour-Browne. *H. porculus*, Bedel — In flood refuse Clubbiedean pond, Pentland Hills, November 1907; Belhaven, near Dunbar, July 1909. The specimens recorded in my former papers as *H. rugosus*, Ol., are doubtless also referable to *H. porculus*.

Henicocerus exculptus, Germ.—1 ♂ and 2 ♀ on mossy stone in the Avon at Carribber (Linlithgow), September 1903.

Octhebius bicolon, Germ.—Isle of May, common, September 1910.

Sphæridium bipustulatum, F., var. *marginatum*, F.—Morningside, Edinburgh, April 1914.

Microglossa nidicola, Fairm.—Two from Sand Martin's nest of previous year, Largo Links, 13th April 1906.

Myrmedonia humeralis, Grav.—Two beside large ant-hill, Trossachs, June 1913.

Conosoma pubescens, Grav.—Kincardine-on-Forth, one, April 1901; West Wemyss, four under stones, August 1904.

Quedius nigriceps, Kr.—Wood near Kirknewton, May 1901, and January 1904. *Q. fulvicollis*, Steph.—Meadow near Kirknewton, one, May 1901; Threipmuir Reservoir, April 1903.

Sunius angustatus, Payk.—Three under stones, Blackford Hill, Edinburgh, March 1905.

Evæsthetus læviusculus, Mann.—One in sphagnum, Aberfoyle, December 1905.

Anthophagus alpinus, Payk.—Cambusmore, near Callander, one off birch, September 1906.

Arpedium brachypterum, Grav.—Bavelaw (Midlothian), February 1903; Harperrig Reservoir, common in flood refuse, April 1903.

Micralymma brevipenne, Gyll.—Several from crevices in rocks on coast, North Berwick, August 1916.

Eusphalerum primulæ, Steph.—Some further records and food plants are: Arniston, a pair in flower of *Lathræa squamaria*, May 1903; Roslin Woods, on flowers of *Allium ursinum* and *Scilla nutans*, May 1904 and 1908.

Hydnobius punctatissimus, Steph.—One swept off rushes, Harperrig Reservoir, Pentlands, 4th November 1909.

Silpha dispar, Herbst.—Still periodically common at Loch Leven: on dead perch, May 1903, etc.

Mycetæa hirta, Marsh.—In poultry-house, Thornton Farm (Fife), December 1905; Bass Rock, one, October 1911.

Endomychus coccineus, L.—A colony under bark of an old beech, Tyninghame, East Lothian, July 1915.

Pocadius ferrugineus, F.—Common in puff-balls (*Lycoperdon gemmatum*), Binning Wood, East Lothian, November 1909.

Ips quadripustulata, L.—Locally common under bark in coniferous woods; Kirknewton, April 1895, etc.; Balerno, May 1903; Eddleston, November 1916.

Ephistemus gyrinoides, Marsh.—Near Colinton, in hay refuse, March 1900; and Kirknewton, April 1903.

Dermestes vulpinus, F.—In taxidermist's shop, Edinburgh, October 1910.

Georyssus pygmæus, F.—Common on banks of Cocklemill burn, near Elie, May and June 1904.

Aphodius scybalarius, F.—One, Gullane, June 1900.

Elater balteatus, L.—Polmaise Moss (Stirling), several, July 1903; Leadburn Moss, one, March 1905.

Corymbites cupreus, F., var. *æruginosus*, F.—Common in the Edinburgh district along with the type. I have it from Braid Hills, May 1879; Pentlands, May 1897, etc.; Loch Leven, May 1898. If it be the var. *chalybeus* of Duncan's list, it has been on record from the Edinburgh district since 1831.

Telephorus obscurus, L.—Polmaise Moss, July 1903.

Malthodes atomus, Thoms.—Isle of May, one, 2nd June 1911.

Cryptocephalus labiatus, L.—Forest Mill, Clackmannan, May 1903.

Chrysomela fastuosa, Scop.—On white dead-nettle (*Lamium album*), Craigentinny, Edinburgh, October 1907; banks of the Tyne, at East Linton, common, April 1913. I have never found it on *Galeopsis*, the food-plant usually cited, but invariably on *L. album*, as did Duncan long ago.

Phytodecta olivacea, Forst., var. *litura*, F.—On broom, common, Balgeddie and Mawcarse (Kinross), June and October 1904.

Hippuriphila modeeri, L.—Near Elie, common, 4th June 1904.

Chætocnema hortensis, Fourc.—Isle of May, one, 20th March 1913.

Psylliodes affinis, Payk.—On *Solanum dulcamara*, Gosford (Haddington), 15th July 1908; Tyninghame, common, 9th July 1910. *P. marcida*, Ill.—Common on *Cakile maritima*, Longniddry shore, July 1908; Belhaven, August 1908; east of Cockburnspath, July 1908; Gullane Point, June 1909; Largo Bay, August 1913. The former species has already been recorded from Longniddry by Prof. Beare (*Ent. Rec.*, 1903).

Tetratoma fungorum, F.—On fungus (*Sparassis crispa*), Tyninghame, September 1909; in *Polyporus betulinus*, Gifford, October 1910, and Binning Wood, common, January 1911 and 1913; Tyninghame, in *P. squamosus*, October 1913.

Hallomenus humeralis, Panz.—I have to thank Mr A. E. J. Carter for specimens which he took on Eskside, near Musselburgh, in July 1902.

Rhinosimus viridipennis, Steph.—Seven off hedge cuttings, Braidburn, Edinburgh, 13th April 1903.

Metœcus paradoxus, L.—A female from wasps' nest, Luffness (Haddington), 1904 (given to me by W. Renton).

Rhynchites nanus, Payk.—Several off birches, Polmaise Moss (Stirling), July 1903; Brucefield (Clackmannan), July 1903; moss west of Bridge of Allan (South Perth), July 1914.

Deporaüs megacephalus, Germ.—Polmaise Moss, July 1903.

Apion pallipes, Kirby — Yester, East Lothian, September 1896; Roslin Glen, on *Allium*, May 1904; Blackford Hill, common under stones where dog's mercury grows, 3rd March 1905.

Otiorhynchus maurus, Gyll.—Top of Bencleuch, Ochils, one, 21st May 1904; Stuc-a-Chroin, one, 17th September 1906.

Exomias araneiformis, Schr.—Further records are:—Braidburn, March, and Cramond, April 1903; Drumshoreland, May 1905; Gifford, April, and Dalmahoy, four, May 1906.

Rhamphus flavicornis, Clairv.—Polmaise Moss, common on birches, July 1903; Aberfoyle, on bog-myrtle, June 1905.

Ceuthorhynchus ericæ, Gyll.—On heath, Boltonmoor (Haddington), several, 30th July 1904; on heather, Bavelaw Moss (Edinburgh), 19th August 1908.

Ceuthorhynchidius pyrrorhynchus, Marsh. — On *Sisymbrium officinale*, Cockburnspath, June 1903; and Gullane, July 1903.

Phytobius canaliculatus, Fahr.—Bavelaw, and Gladhouse Reservoir, April 1903.

Magdalis pruni, L.—Bridge of Allan, one (female) taken 28th June 1901. Identification confirmed by Prof. Beare.

The following species have been recorded by me in scattered notes, mostly in this magazine, during the past ten or twelve years:—

Miscodera arctica, Payk; *Bembidium quinquestriatum*, Gyll. (*Ent. Mo. Mag.*, 1916); *B. paludosum*, Panz.; *Cœlambus quinquelineatus*, Ztt.; *Aleochara spadicea*, Er.; *Quedius longicornis*, Kr.; *Quedionuchus lævigatus*, Gyll.; *Lathrobium multipunctum*, Grav., etc.; *Tychus niger*, Payk; *Gnathoncus rotundatus*, Kug.; *Micrambe villosa*, Heer; *Phlœophilus edwardsi*, Steph. (*Ent. Mo. Mag.*, 1909); *Ptinus tectus*, Boield.; *Cis festivus*, Panz.; *Nacerdes melanura*, Schm.; *Arœocerus fasciculatus*, De G.; *Calandra oryzæ*, L. For species from moles' nests in this district, see paper by Beare and Evans, 1909.

CORRECTIONS:—In the first instalment of this paper, F., after *Trypodendron lineatum*, should be Ol.; and the date of the third specimen of *Grammoptera tabacicolor* should be 1st July, not June, 1911.

(*Authors are responsible for nomenclature used.*)

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ON THE PALE-BREASTED OR AMERICAN BRENT GOOSE IN SCOTLAND.

By Leonora Jeffrey Rintoul, F.Z.S., H.M.B.O.U., and Evelyn V. Baxter, F.Z.S., H.M.B.O.U.

The authenticated occurrences of the American Brent Goose (*Branta bernicla glaucogastra* (Brehm)) in Scotland are few, and on going into the records of this and the typical form *B. b. bernicla*, we were surprised to find in how few instances they had been differentiated. We have for some time been working at a Topographical Avifauna of Scotland, which we hope to publish at the end of the war, and finding the Scottish distribution of the Brent Geese so inextricably entangled, we decided to ask Scottish naturalists and sportsmen to help us by sending notes of the occurrence and relative abundance of the two races.

In the new *B.O.U. List of British Birds*, the respective British distribution of the two forms is given as follows:— The Brent Goose is "a winter visitor, numerous in the Shetlands and Orkneys and on the east and south coasts of Great Britain. In the Hebrides and on the western shores it is much less numerous and more irregular. It is very common on the coasts of Ireland, and is seldom met with on inland waters unless wounded." Other authorities, however, say that the Brent Goose is scarce in Shetland,

and occurs there chiefly as a passage migrant. The American Brent is stated in the same work to be "a winter visitor, met with among flocks of *B. bernicla* on the east coast of Great Britain, mostly to the north of the Humber, and notably on the Northumberland coast, where it appears to be more abundant than *B. bernicla*. The same seems to be true about the south-east coast of Ireland. In the Cromarty Firth it is not uncommon among the vast flocks of Brent Geese. It has also been recorded from the Solway Firth and Essex." Besides these, there are Scottish records from the Moray Firth (*A Fauna of the Tay Basin and Strathmore*, p. 226); Skye (*A Fauna of the North-West Highlands and Skye*, p. 225), where it is said to be the commoner form off Waternish; and Balgray Dam, East Renfrew, where one was seen on 1st January 1911 (*Glas. Nat.*, iii. 52). By the kindness of the authorities at the Royal Scottish Museum, we have been able to examine the Brent Geese in the collection there, and found, somewhat to our surprise, that the large majority belonged to the American form. These comprise two males—one from Fair Isle, 16th January 1914, the other from the Firth of Forth, February 1912; a female from Fair Isle, 30th April 1913; and a young male from Dunrossness, Shetland, 19th December 1902. Also three not sexed—one from the River Tay, 10th February 1879, and two from Barra, Outer Hebrides, January 1909 and 19th October 1914. The only representatives of the typical form in the Museum are two birds—one from Shetland, the other from the Outer Hebrides.

From a study of the foreign distribution of the two subspecies, one would expect the typical race of Brent to be by far the commoner on the shores of Scotland; how far this is so cannot be satisfactorily established from the meagre evidence at present available. Our desire is to arrive at a just estimate of the relative numbers of the two races occurring in Scotland, and we shall be grateful to anyone who will send us definite records of the occurrence and abundance of either from any part of the kingdom.

THE STEWARTRY OF KIRKCUDBRIGHT AND ITS INLAND MOLLUSCAN FAUNA.

By W. Denison Roebuck, M.Sc., F.L.S.

(*Concluded from page* 12.)

Helicella virgata.

New Galloway, one (David Robertson; Kelvingrove Museum, Glasgow, May 1913). This record requires confirmation or further investigation.

Helicella acuta.

New Galloway, one (David Robertson; Kelvingrove Museum, Glasgow, May 1913).

New Galloway, being completely an inland locality, seems very unlikely as a station for this species, whose range in Great Britain is exclusively confined to the coast-line of the south and west from Sussex to Cape Wrath, the extreme N.W. point of the island, and it is desirable that the papers of the late Dr Robertson, which I believe are preserved in the Kelvingrove Museum at Glasgow, should be examined for further evidence. Since this was written, Mr Peter M'Nair has been kind enough to refer to the Robertson MSS., which he finds do not throw any further light upon the subject.

Hygromia striolata (*rufescens*).

Maxwelltown, 13th September 1890 (Wm. Evans); Castle Douglas, same date, type and vars. *rubens*, *albida*, and *albocincta* (*id.*).

Hygromia hispida.

Close to Kirkcudbright, several var. *concinna* and one var. *hispidosa*, collected by Wm. Thomson (Fred. R. Coles, 22nd March 1884); under dead leaves in garden near Kirkcudbright, 2nd March 1884, var. *hispidosa*, numerous (*id.*); Tongland Hill, 24th February 1884 (*id.*); Tongland, var. *hispidosa*, two, large (*id.*, February 1885); New Galloway, two (David Robertson; Kelvingrove Museum, Glasgow, May 1913); Glen Burn, just above the mill, under stones, 19th August 1890, one (R. Rimmer; Roy. Scot. Mus., Edinburgh); Mabie Marthroun, 8th May 1889, a few (*id.*); Terregles, numerous (*id.*); Castle Douglas, September 1890 (Wm. Evans); Creetown, 25th May 1912 (Edward Collier).

Hygromia fusca.

Dee, Tongland, December 1882 (Fred. R. Coles, now in coll. J. W. Taylor); Tarff, Twyn side, 27th February 1884 (*id.*);

Hygromia fusca.

Tarff braes, 19th August 1884 (*id.*); Tongland, three (*id.*, February 1885).

Pupa cylindracea.

On Colly Wall, under moss, 28th February 1884 (Fred. R. Coles); Upper Cannee Wood, among moss, 6th March 1884 (*id.*); Glen Burn, just above the mill, under stones, 19th August 1890, a few (R. Rimmer; Roy. Scot. Mus., Edinburgh); Glen Burn, September 1890, a few (*id.*); Castle Douglas, September 1890 (Wm. Evans); Mabie, on fallen beech-leaves near old ash-tree (Miss M. Henriette Rimmer; Roy. Scot. Mus., Edinburgh, May 1913).

Vertigo substriata.

Two and a half miles from Dalbeattie, a large crag on the Palnackie road, August 1903, common (Marie V. Lebour).

Vertigo pygmæa.

Glen Burn, August 1890, one (R. Rimmer; Roy. Scot. Mus., Edinburgh); Glen Burn, August 1893, one (*id.*).

Vertigo pusilla.

Cluden Mills, 1880, under stones, a few (R. Rimmer; Roy. Scot. Mus., Edinburgh); banks of the Clouden near Maxwelltown (R. Rimmer, before 1890); Glen Burn, above the mill, 19th August, and September 1890, several (R. Rimmer; Roy. Scot. Mus.); Glen Burn, August 1893, one (*id.*).

Sphyradium edentulum.

Oswald's Wood, on banks of Cluden, 1880, a few, and 21st June 1890, two (R. Rimmer; Roy. Scot. Mus., Edinburgh); near Lotus Lodge, 1880, under stones, a few (*id.*); Mabie Woods, May 1889, one (*id.*); the Glen, Cargen Burn, under stones, September 1889, two (*id.*); Shambellie, several (*id.*); near Dalbeattie, August 1903, several (Marie V. Lebour).

Balea perversa.

Underwood Farm, Dee, Tongland, on bark of ash, 8th February 1884 (Fred. R. Coles); Castle Douglas, September 1890 (Wm. Evans).

Clausilia bidentata.

Dee, Tongland, December 1882, numerous (Fred. R. Coles); close to Kirkcudbright, collected by Wm. Thomson (*id.*, 22nd March 1884); Tongland, young examples in crevices of hawthorn bark, 1st May 1884 (*id.*); Glen Cargen Burn, 1880, several (R. Rimmer; Roy. Scot. Mus., Edinburgh, May 1913); Glen Burn, just above the mill, under stones, 19th August 1890, one (*id.*); Glen Burn, August 1893, one (*id.*).

Cochlicopa lubrica.

Skirnay Wood, Tongland, 14th February 1884, three (Fred. R. Coles); Glen Cargen Burn, 1880, several (R. Rimmer; Roy. Scot. Mus., Edinburgh, May 1913); Mabie, on fallen beech-leaves, May 1889, one, small, dead (*id.*); Mabie Woods, May 1889, one, young (*id.*); Castle Douglas, September 1890 (Wm. Evans); Kippford, Dalbeattie, January 1907 (R. Godfrey).

Carychium minimum.

Twynholm, bank of Tarff, 27th February 1884, several (Fred. R. Coles); on Colly Wall, under moss, 28th February 1884, one (*id.*); Mabie Woods, May 1889, several (R. Rimmer; Roy. Scot. Mus., Edinburgh); Maxwelltown, 13th September 1890 (Wm. Evans); Castle Douglas, same date (*id.*).

Succinea putris.

Twynholm, Tarffside, under stones and leaves, 27th February 1884 (Fred. R. Coles); Hermitage Bank, Tongland, 6th May 1884 (*id.*); Tarff, on *Iris* and sedge, June 1884 (*id.*); Twynholm, one, small (*id.*, January 1885); Loch Kinder, one, small (R. Rimmer; Roy. Scot. Mus., Edinburgh, May 1913); Douglas Hall, August 1880, numerous, including a few var. *albida* (*id.*); Castle Douglas, September 1890 (Wm. Evans); Maxwelltown, same date (*id.*).

Succinea elegans.

Tarff, Free Kirk Reach, on *Iris* and sedge, June 1884 (Fred. R. Coles).

Acicula lineata.

Two and a half miles from Dalbeattie, a large crag on the Palnackie road, August 1903, one (Miss M. V. Lebour).

Limnæa truncatula.

Black Stockton, 22nd August 1884, one young specimen (Fred. R. Coles); Mabie, in Lochaber Wood, July 1884, several (R. Rimmer; Roy. Scot. Mus., Edinburgh); Mabie, in small stream crossing the road to Marthroun, above the house, 8th May 1889, numerous (*id.*); Castle Douglas, September 1890 (Wm. Evans).

Limnæa palustris.

Carlingwark Loch, 1880, a few, juv. (R. Rimmer; Roy. Scot. Mus., Edinburgh); Loch End near to Douglas Hall, August 1880, one, juv. (*id.*); clear stream near bridge at Glox, Tarff, June 1884 (Fred. R. Coles); Argrennan, ditch, 22nd April 1884 (*id.*); Castle Douglas, September 1890 (Wm. Evans).

BIOLOGICAL L... WOODS HOL...

Limnæa peregra.

St Mary's Isle, on *Callitriche*, 15th March 1884 (Fred. R. Coles); Bigloch, Langbarns, 10th April 1884 (*id.*); High Clachan Loch, 12th April 1884, var. *ovata* (*id.*); clear ditch out of Argrennan mill-dam, Tongland, 22nd April 1884, several (*id.*); Ingleston mill-dam, Twynholme, 30th April 1884 (*id.*); Tarff, Free Kirk Reach, 27th August 1884 (*id.*); Grange Pond, 29th August 1884 (*id.*); White Loch, two miles from Rockcliffe (Miss Jessie Hele, 13th April 1885); River Cluden close to Irongrey Bridge, 1877, several, small (R. Rimmer; Roy. Scot. Mus.); River Clouden at Irongrey, two (*id.*); Loch Kinder, a few, var. *lacustris* (*id.*); Loch End near to Douglas Hall, August 1880, one, juv. (*id.*); Carlingwark Loch, 1880, two (*id.*); Maxwelltown, September 1890 (Wm. Evans); Castle Douglas, same date (*id.*); Gatehouse of Fleet, var. *ovata*, numerous (Rev. G. A. Frank Knight, before July 1895); Gatehouse of Fleet, aff. var. *lacustris*, numerous (*id.*).

Limnæa auricularia.

Carlingwark Loch, 1880, one (R. Rimmer; Roy. Scot. Mus., Edinburgh); Bigloch, Langbarns, 10th April 1884, one dead specimen (Fred. R. Coles); Gatehouse of Fleet, two (G. A. Frank Knight, before 1895).

Physa fontinalis.

Tarff, Tongland, 8th August 1884 (Fred. R. Coles); Loch End near to Douglas Hall, August 1880, a few (R. Rimmer; Roy. Scot. Mus., Edinburgh); Castle Douglas, 13th September 1890, a few (Wm. Evans); Maxwelltown, same date, three (*id.*)

Planorbis albus.

Tarff, Tongland, 14th June and 5th August 1884 (Fred. R. Coles); Black Stockton, 22nd August 1884 (*id.*); Tarff, Free Kirk Reach, 27th August 1884 (*id.*); Dee, 19th August 1884, two (*id.*); Castle Douglas Loch, October 1890, three (R. Rimmer; Roy. Scot. Mus., Edinburgh, May 1913); Castle Douglas, September 1890 (Wm. Evans); Maxwelltown, same date (*id.*).

Planorbis crista.

High Boreland, 17th July 1884 (Fred. R. Coles).

Planorbis carinatus.

New Galloway, one, juv. (David Robertson; Kelvingrove Museum, Glasgow, May 1913).

This record needs confirmation or investigation.

Planorbis umbilicatus.

Maxwelltown, abundant, 13th September 1890 (Wm. Evans); Babington's Loch, June 1890, many, collected by R. Service (*id.*).

Planorbis spirorbis.

St Mary's Isle, under water, 15th March 1884 (Fred. R. Coles); The Isle, 15th November 1884 (*id.*); Carlingwark Loch, several, 1880 (R. Rimmer; Roy. Scot. Mus., Edinburgh).

Planorbis contortus.

Loch Finn, 26th April 1884 (Fred. R. Coles); Tarff, Tongland, 8th August 1884 (*id.*); Black Stockton, 22nd August 1884 (*id.*); Tarff, Free Kirk Reach, 27th August 1884 (*id.*); Argrennan mill-dam, 3rd September 1884 (*id.*); Maxwelltown, 13th September 1890, several (Wm. Evans); Castle Douglas, 13th September 1890, several (*id.*); Castle Douglas Loch, October 1890, two (R. Rimmer; Roy. Scot. Mus., Edinburgh, May 1913); Loch End, near to Douglas Hall, August 1880, one (*id.*).

Ancylus fluviatilis.

Tongland, dam, 10th April 1884 (Fred. R. Coles); Tarff, Ringford, 14th June 1884 (*id.*); Culdoch Burn, June 1884 (*id.*); Tarff, 5th August 1884, var. *albida* (*id.*); Castle Douglas, September 1890 (Wm. Evans); Castle Douglas Loch, October 1890, one (R. Rimmer; Roy. Scot. Mus., Edinburgh, May 1913); Loch Kinder, one (*id.*).

Acroloxus lacustris.

Tarff, Ringford, 14th June 1884 (Fred. R. Coles); Castle Douglas Loch, October 1890, one, var. *compressa* (R. Rimmer; Roy. Scot. Mus., Edinburgh, May 1913).

Bythinia tentaculata.

Carlingwark Loch, 1880, several (R. Rimmer; Roy. Scot. Mus., Edinburgh); Castle Douglas Loch, October 1890, several (*id.*); Carlingwark Loch, Castle Douglas, September 1890 (Wm. Evans); Dalbeattie Burn, a few, monst. *decollatum*, August 1903 (Miss M. V. Lebour).

Valvata piscinalis.

Tarff, Tongland, 5th and 8th August 1884 (Fred. R. Coles); Tarff, Free Kirk Reach, 27th August 1884 (*id.*); Castle Douglas, September 1890 (Wm. Evans); Maxwelltown, same date (*id.*).

Valvata cristata.

Dee, 19th August 1884 (Fred. R. Coles); Black Stockton, 22nd August 1884 (*id.*).

Anodonta cygnea.

Carlingwark Loch (R. Rimmer; Roy. Scot. Mus., Edinburgh).

Sphærium corneum.

Argrennan, ditch, 22nd April 1884 (Fred. R. Coles); Loch Finn, 26th April 1884 (*id.*); Castle Douglas, September 1890 (Wm. Evans); Maxwelltown, same date (*id.*); Castle Douglas Loch, October 1890, one, small; also a couple of var. *nucleus* (R. Rimmer; Roy. Scot. Mus., Edinburgh, May 1913).

Pisidium fontinale.

Black Stockton mill-dam, 28th April 1884 (Fred. R. Coles); Maxwelltown, 13th September 1890 (Wm. Evans).

Pisidium pulchellum.

Maxwelltown, September 1890 (Wm. Evans).

Pisidium cinereum (*casertanum*).

Curling-pond above Creetown, 25th May 1912 (Edward Collier).

Pisidium pusillum.

Black Stockton mill-dam, 28th April 1884 (Fred. R. Coles); Argrennan mill-dam, 3rd September 1884 (*id.*); Mabie, in small stream crossing the road to Marthroun above the house, 8th May 1889, numerous (R. Rimmer; Roy. Scot. Mus., Edinburgh); Maxwelltown, September 1890 (Wm. Evans); Castle Douglas, same date (*id.*).

Pisidium milium.

Clouden, near Irongray, a few (R. Rimmer; Roy. Scot. Mus., Edinburgh, May 1913); Ingleston Loch, Twynholm, 30th April 1884 (Fred. R. Coles); Maxwelltown, September 1890 (Wm. Evans).

The list thus includes 11 slugs, 35 land and 23 fresh-water shells—a total of 69; 3, however, seem to need confirmation.

The deficiencies which offer themselves for further research, confining our attention to those which have been authenticated for one or more of the three adjoining counties, Wigtown, Ayr, and Dumfries, are as follows, the letters W, A, D designating these areas:—

Agriolimax lævis	—	—	D	*Pupa anglica*	W	A	—
Hyalinia helvetica	—	A	D	*Pupa muscorum*	—	A	—
Helicella caperata	W	A	—	*Limnæa burnetti*	—	—	D
Hygromia granulata	—	A	—	*Planorbis fontanus*	—	—	D
Vallonia pulchella	W	A	—	*Unio margaritifer*	W	A	D
				Pisidium nitidum	—	—	D

On the other hand, 7 species found in the Stewartry have not been authenticated from any of the three adjoining areas, viz.:—

Testacella haliotidea.
Limax flavus.
Limnæa auricularia.
Planorbis carinatus.
Acroloxus lacustris.
Valvata cristata.
Anodonta cygnea.

There is sufficient work for anyone desirous of working up further distribution, particularly up the valleys; but the principal desideratum is the record of the slugs, to which only the slightest attention has been paid. These I should be glad to see, living, in air-tight tins—for which my address is 259 Hyde Park Road, Leeds.

Siberian Chiffchaff (Phylloscopus collybita tristis) at Little Ross Lighthouse, Kirkcudbrightshire. — On the morning of 3rd December 1916, with a light breeze from the N.E., a drizzle of rain, and haze, there were numerous birds at the lantern at Little Ross. Curlews, Lapwings, Redwings, Fieldfares, Thrushes, Larks, Knots, Golden Plover, and Snipe were plentiful, also various other Waders. I was out capturing a Curlew, when I saw a tiny Warbler fluttering against the lantern. On examination, I saw it was something uncommon, as the lateness of the season led me to expect. I therefore sent it to Miss Rintoul and Miss Baxter, who inform me that it is a Siberian Chiffchaff.—William Begg, Little Ross Lighthouse.

[This is a very interesting and important record, being the first time this little visitor from the East has been recorded from south-western Scotland. It has been known to occur on the Orkney and Shetland Islands and the Isle of May, but with the exception of Sule Skerry, there is no record from the West, nor has it hitherto been noted as far south in Scotland as Kirkcudbrightshire.—Eds.]

Early Appearance of Swift.—In connection with Mr Serle's note in the September number (p. 240), it may be of interest to state that I saw a Swift near Giffnock on 23rd April this year (1916). On the same day of the month in 1902, Mr John Craig, Beith, observed it at Kilbirnie Loch, near Beith. These, so far as I know, are the earliest dates for the "Clyde" area. In nine out of the twenty-four years, 1893 to 1916, the Swift has first been noted in "Clyde" in April.—John Robertson, Glasgow.

Black-headed Gulls at the Flannan Isles.—In the early morning of 31st December 1916, a pair of strange Gulls arrived at Eilean Mor, one of the Flannan Isles. As I had never seen birds like them before, I shot one and sent it to Dr Eagle Clarke for identification. He tells me that it is an immature specimen of the Black-headed Gull (*Larus ridibundus*), a species which is uncommon so far west, being a littoral or shore bird during the autumn and winter, and rarely visiting such pelagic islands as the Flannans and St Kilda.—James Campbell, Flannan Islands Lighthouse.

English-bred Black-headed Gulls recovered in Scotland.—Besides the English-bred Black-headed Gulls (*Larus ridibundus*) nesting in Scotland, which I mentioned in the December number of the *Scottish Naturalist*, it may be of interest to enumerate the others also recovered in Scotland, as mentioned in my article in *British Birds*, vol. viii. pp. 209-218.

Of those marked at Ravenglass, in Cumberland, which went north by the west coast, three only reached north of the Clyde, viz., one, six months later to Argyllshire, and two to Dumbartonshire three months afterwards. Others occurred in Lanark, Renfrew, and Ayr, and in the neighbouring counties of Dumfries and Kirkcudbright, within one to seven months, and another in Dumfries a year and three months after being marked as a nestling. Of those travelling north from Ravenglass up the east coast, one was obtained as far north as Fraserburgh, in Aberdeenshire, eight months afterwards, and one three months afterwards in Perthshire. Five others were reported from the counties of Midlothian, Stirling, Kinross, and Selkirk, from one to three months after marking. Of those marked on Denton Fell, Cumberland, two occurred in Dumfriesshire, two years and ten months, and two years and seven months, respectively, after marking.

Since my article was written other Ravenglass-bred Black-headed Gulls have been recovered in Kirkcudbrightshire three years and seven months after marking, and a bird marked on the island of Anglesea, North Wales, was recovered on Loch Long, in Dumbartonshire, four and a half years afterwards.

Two other Ravenglass-bred birds were also recovered at Thornhill, in Dumfriesshire, and in Glasgow, five years and three months, and three years and three months, respectively, after marking as nestlings.—H. W. Robinson, M.B.O.U., Lancaster.

TRICHONISCOIDES SARSI, A WOODLOUSE NEW TO THE SCOTTISH FAUNA, ON THE ISLE OF MAY.

By William Evans, F.R.S.E.

While spending a few days on the Isle of May during the second half of September 1910 I found, under stones on the margin of a grass field south of the lighthouse buildings, a number of small woodlice belonging to the family Trichoniscidæ. The majority were the common *Trichoniscus pusillus*, but there were two specimens of a different, and to me unknown, species. These I sent to Mr R. S. Bagnall, who recognised them as belonging to the genus *Trichoniscoides*, G. O. Sars; but owing to their imperfect condition he could not say to which species. On 7th November 1912 I devoted half an hour to turning over stones in the same locality, and secured, besides several of *Trichoniscus pusillus*, an example of *T. pygmæus*, G. O. Sars, and one of the *Trichoniscoides*. These have been recently submitted to Dr W. E. Collinge, who is preparing an exhaustive monograph of the British Terrestrial Isopoda, and he unhesitatingly identifies the *Trichoniscoides* as *T. sarsi*, Patience. In all particulars, he says, it agrees with the original description, except in colour—a point of little importance, in view of the length of time the specimen has been immersed in spirit.

Trichoniscoides sarsi was separated from *T. albidus* (Budde-Lund) by Mr Alex. Patience in a paper, published in 1908, in the *Annals and Magazine of Natural History* (ser. 8, vol. ii., pp. 84-88, pl. vi.), his specimens of the former being from Norway—whence Prof. Sars had recorded and described it under the name of *T. albidus* (B.-L.)—and those of the latter from the west of Scotland (Clyde area). At that time *T. sarsi* was not known to occur in the British Islands; but a few years later, namely in March 1912, Mr Bagnall discovered it on the coast of Yorkshire, as recorded in *The Zoologist* for May of that year, p. 193, and he has since then (in July 1914) taken it on the Durham coast (see *The Vasculum* for June

1916, p. 64). So far as I am aware, the present is the first record of it from Scotland.

I may add that I found *Trichoniscus pygmæus* in cracks in weathered rocks at Gullane Point, East Lothian, on 5th June 1913. Specimens taken by Mr Bagnall and myself in Edinburgh and its immediate vicinity were recorded by him in the February 1913 number of this magazine.

The Spawn of the Lugworm.—In spite of the fact that Lugworms occur in hundreds, and often in thousands, on almost every stretch of muddy sand on the coasts of Europe, and of the fact that time and again search has been made by the most competent observers, the confession has to be made that the egg-masses of the Lugworm have never been recognised. Hence much interest attaches to the observations of Dr H. C. Williamson (*Journal of Zoological Research*, October 1916) on what he takes to be the spawning of specimens of *Arenicola* kept in confinement. After the Lugworms had been retained in their box of sand, supplied with running sea-water for a fortnight, a green gelatinous capsule containing green eggs was found attached to the glass. Three other similar capsules were laid in the course of a month. The experiment, unfortunately, was not kept entirely free from chances of error, so that it can hardly be accepted as conclusively showing that any of those green gooseberry-like masses of ova which have so long been a puzzle to the shore-naturalist are the egg-capsules of the common Lugworm.

Hellicella caperata at Inverugie.—In May 1892 the Rev. Dr George Gordon sent me three small specimens from Inverugie, in Elginshire, which I placed on record for Aberdeenshire North in a note in the *Annals of Scottish Natural History* for October 1892, p. 238, but it was the Elginshire, not the Aberdeenshire, place of that name.—W. Denison Roebuck.

Leucochloridium macrostomum (Rud.), a Trematode new to Britain.—In the *Glasgow Naturalist*, vol. viii. p. 43, three specimens of this Trematode are recorded by Mr J. Ritchie, jun., from the intestine of a Great Grey Shrike (*Lanius excubitor*) taken in Ayrshire in Dec. 1915. This parasite is stated to have hitherto been recorded only from Germany, but Mr Ritchie is of opinion that it may have been overlooked in this country, as he obtained five examples in the rectum of the Starling (*Sturnus vulgaris*) in November 1915.

WATER MITES.

By William Williamson, F.R.S.E.

One is inclined to think that in many cases the lack of interest in Natural History is not due so much to indifference on the part of the individual as to lack of knowledge of what to seek out and how to seek it. Many books throw so little light on the different groups of creatures, that darkness is only made more evident. Specialisation has become intense, and the general writer, in his endeavour to cover much ground, must leave many things unsaid, with the result that the reader's acquired ideas are of a nebulous type. The solution of the difficulty lies in the hands of the specialist—a fact which was recognised by German zoologists in that useful series of handbooks, *Süsswasserfauna Deutschlands*, in which the characteristics of various groups are set forth clearly and the identification of miscellaneous material greatly simplified to the collector. The publication of a series of similar manuals for Britain is not at present feasible; however, a step in the right direction would be made if specialists were to supplement the studies which have already appeared ("Study of the Diptera," *ante*, 1916, p. 85, and "Scottish Hairworms," *ante*, 1915, p. 111, 136, 142) by studies of the less known groups, and it is believed that by the dissemination of this knowledge much good material might be salved for the benefit of zoology.

In consonance with the foregoing observations, a study of the water mites is submitted, in the hope that others may be attracted to the subject.

General Characters.

Before going further, reference may be made to certain structural details. An inspection of each of the species referred to below will show that there are eight legs—four on each side—and that these articulate with four groups of plates—two on each side of the antero-ventral body surface.

Each plate really consists of two fused together, so that there are actually eight plates—one for each leg. These plates are termed epimera, a word which is used in quite a different sense from that used by Huxley (*Crayfish*, vol. 28, Inter. Sc. Series). As the muscles which actuate the leg spread out in fan shape from it to be anchored on the farther edge of the plates, it is obvious that these must be of appropriate size and strength. Accordingly, we find that in those water mites which are soft-skinned, the plates are well defined and have strong margins, and that in those that are hard-skinned, the plates may not be so well defined. Considerable variety in the epimera may be noted in different species; in some species, the epimera may even be fused into one plate, covering from about half to the whole of the ventral surface. The capitulum lies in the bay formed between the first pair of epimera. It is small, and has a limited power of movement. Its ventral surface is a hard plate, considered by some writers to represent a pair of maxillæ fused together. The walls form a chamber, at the apex of which the mouth is usually situated. The dorsal wall forms a groove within which the mandibles lie. In the halacarids, the groove is wanting. On the dorsal wall also the stigmata or external breathing organs may be noted. On the capitulum there will be observed a pair of palpi, much diversity will be found in the character of these, but all agree in having five segments. Posterior to the epimera is the genital area. Great diversity, incident to species and sex, may be noted; and again we meet with a term, acetabula, which, more commonly used in another sense, is rigidly confined in hydracarid terminology to the genitalia. As so applied it refers to the glands, represented externally by discs let into the genital plates. These glands may even be everted and become stipitate, but the term is still applied to them. Many varied forms of genitalia are to be met with. In one genus, the vulva has neither plates nor acetabula; in another, acetabula only are present; and in others, the acetabula are either embedded in plates or protected by plates hinged to the body at their outer edge, so that they can meet at the centre and cover the acetabula.

Collection and Preservation.

Water mites are to be found not only in standing water, ranging in size from our largest lochs to narrow ditches, but also in rivers and streams. Many can be found among the aquatic vegetation by sweeping with a fine net attached to a stick or a long cord. A small bottle or tube at the end of the net allows the collector to ascertain readily the nature of the booty. Other species may be found creeping over the surface of the mud or among submerged stones. On the gills of fresh-water mussels certain species of Unionicola are only to be found. Attention paid to water insects like Notonecta, Nepa, Dytiscus, Corixa, etc., and even to Dragonflies, will reward the observer with the so-called larval parasitic stage of water mites. Observations on the migrations of insects known to be hosts of water-mite larvæ might yield much valuable information to account for the distribution of species whose existence in certain areas has been accounted for as *glazialrelikt.*

The most useful medium for killing and preserving water mites is a mixture of glycerine, water, and acetic acid, in the proportion of 11, 6, and 3 respectively After a few days mites placed in this solution resume their normal shape and for long remain soft. The use of glycerine is at present to be avoided, but a preparation consisting of thymol (1 vol. of abs. alcohol sol.), 2 per cent. glacial acetic acid (1 vol.), absolute alcohol (2 vols.), and distilled water (4 vols.) may be employed with equally good results (Koenike's formula). Formaline is, if possible, to be avoided, as it is very apt to render material unsuitable for examination. Seventy per cent. alcohol would be better. Tubes containing material should be promptly labelled with date and place of capture.[1]

[1] For labelling, a slip of paper with data written in pencil, but preferably with waterproof ink, should be inserted in the storage tube. Where glycerine is used, I find the most durable labels are slips of tracing-paper on which details are written with waterproof ink. Heat from lamp or fire dries the ink, and slightly melts the waxy surface of the paper, allowing the ink to sink further in. Placed in glycerine, the paper becomes transparent, leaving the black writing to stand out prominently. Such labels are very durable. Pencil or ordinary ink becomes obliterated very quickly.

Life-History.

So far as our incomplete knowledge of the life-history goes, there would appear to be four stages—the egg, larva, nymph, and imago. The eggs are almost without exception enclosed in a gelatinous mass, which serves to anchor them to the spot where they have been deposited. While the gelatinous covering may to some extent act as a protection to the egg during development, it is not proof against attack by at least one species of Ostracod.[1] After the lapse of varying periods, the hexapod larva emerges. The principal object of the larva appears to be to find a host to which it may attach itself by means of the relatively strong palpi with which it is furnished. This stage is generally—perhaps not quite correctly—called the parasitic stage. It is very doubtful if the larva is really parasitic at all, as shortly after attachment the limbs drop off and the larval body begins to swell out owing to the development of the nymphal body within. When mature, the skin is ruptured and the eight-legged nymph emerges. The host is of necessity some insect which either inhabits or spends part of its existence near the surface of water. Consequently, during the transition from larva to nymph, the mite exists for considerable intervals, *i.e.* during the flight of insects, out of the water, and in this way in many cases the dispersal of species may be accounted for. Nymphs may readily be distinguished from adults by the presence of what has been termed a provisional genital area.

Classification of the Water Mite.

It is beyond the scope of the present article to consider the varied views of writers as to the position of the Acarina. For our immediate purpose consideration will be limited to the Hydracarina,[2] which a recent classification treats as a suborder divided into three families—the Halacaridæ inhabiting salt water, and the Limnocharidæ and Hygrobatidæ

[1] *Proc. Roy. Phys. Soc.*, xviii. 92-94

[2] Water mites were for long known as Hydrachnidæ, but a more suitable term is now employed, viz. Hydracarina.

inhabiting fresh water. A few of the halacarid or essentially salt-water forms have invaded the fresh water, while a few of the hydracarid[1] or fresh-water forms have migrated to the salt and brackish waters. Our study of the water mite will be confined to the hydracarid forms *Thyas venusta* (Limnocharidæ) and *Limnesia fulgida* (Hygrobatidæ), but before considering these in detail it is desirable to know, apart from the striking difference in the larval forms, the conspicuous characters to be encountered in the more commonly met with adult forms in these families.

Limnocharidæ.

Water mites sometimes attaining a *length* of about 5 mm. *Colour* red. *Body*, as a rule, not arched (except in sub-fam. Hydrarachninæ). *Skin* soft, generally with a papillated cuticle, frequently exhibiting one or more chitinous plates, rarely entirely hard.

Unpaired median Eye frequently present in addition to the normal eyes, the latter usually enclosed in a capsule.

Capitulum, as a rule, ending in a rostrum.

Epimera not covering much of the ventral surface, almost without exception in four groups.

Genital Area never removed from the epimeral region, as a rule, without externally noticeable sex dimorphism.

Hygrobatidæ.

Water mites generally of *small size*. *Colour* varied. *Body*, as a rule, highly arched. *Skin* ranging from soft to a rigid exo-skeleton. Chitinous plates almost entirely absent.

Unpaired median Eye never present, normal eyes not enclosed in a capsule.

Capitulum generally without a rostrum.

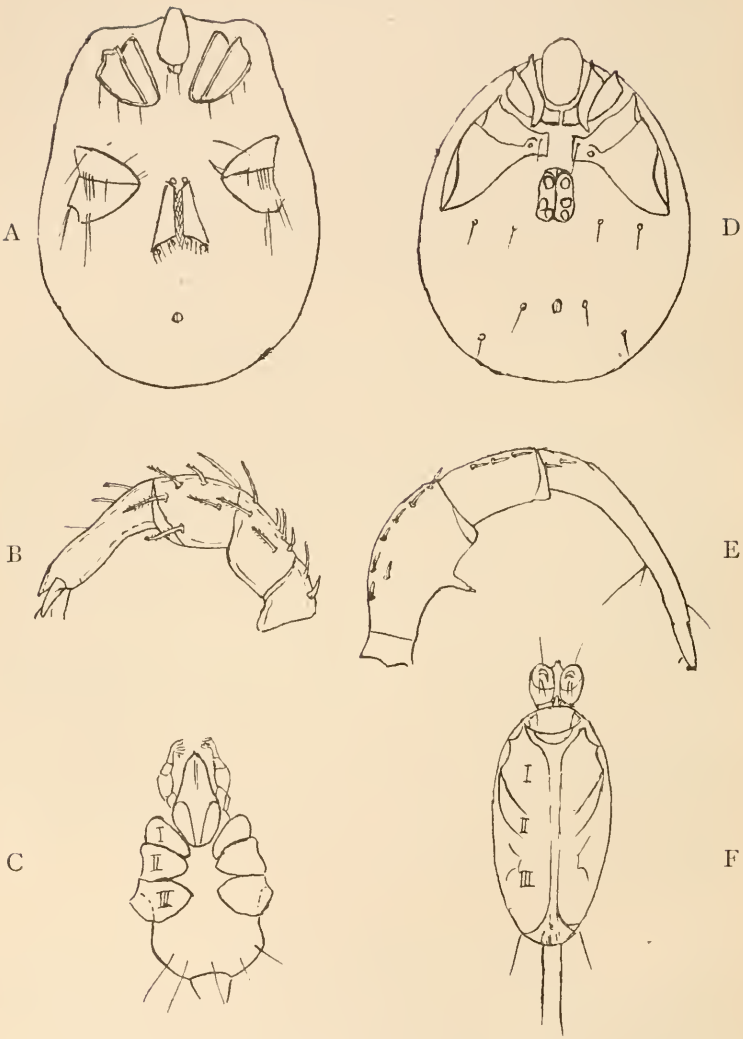
Epimera frequently of considerable size; plates not seldom adjoining one another and partly fused with one another.

Genital Area often standing well back from epimeral area. Sex dimorphism frequently sharply defined.

Thyas venusta C. L. Koch.

It will be noticed at the outset that the body colour is red, the legs and palpi being a little paler. This holds for the family almost without exception. The body is flattened; in considering its outline, it is to be observed that the anterior margin is slightly arched, and that the extremities of this margin are continued to form well-defined shoulders.

[1] *Proc. Roy. Phys. Soc.*, xviii. 92.



A, B, C—*Thyas venusta.*
A = Ventral Surface. B = Palpus. C = Larva

D, E, F—*Limnesia fulgida.*
D = Ventral Surface, ♀. E = Palpus. F = Larva. I, II, III = Epimera.

Behind these the body contracts slightly from side to side, passing thence into a sweeping curve extending round the posterior end of body. The skin is covered with small, rounded papillæ, and along the dorsum are four rows of gland pores, each with its guard hair. It will be observed that the pores of the two inner rows are connected longitudinally and transversely by a weak depression, suggesting the outline of a ladder. In some respects, young forms differ somewhat from the older, the outline being more oval and the dorsum slightly arched. On the anterior dorsum will be noticed two eye capsules, lying on the flattened portion of the anterior edge of body. Each capsule consists of two portions, a large anterior and a small posterior one, each containing an eye of corresponding size. On the median line, a little posterior to these, is the so-called median eye, surrounded by a small chitinous ring. In some species the ring develops into a well-marked plate. Between the eyes, on the body margin, are two short bristles—these are known as the antenniform bristles. The dorsum does not here call for further comment; more detail is, however, presented by the venter. As indicated before, there are eight epimeral plates, four on each side, fused into two groups—the first pair to the second, and the third to the fourth. The first pair are long and narrow, and of about equal width throughout. The second pair are shorter and rather broader, their posterior end being somewhat acute. The fourth pair are rather more rectangular than the third. The interval between the groups is considerable, and the edges are thick, with a number of hairs dotted along them. The capitulum is situated between the first pair of epimera, to a limited degree it is capable of being protruded or retracted. The capitulum is cone-shaped, with the apex bent rather towards the ventral surface. At the apex is the mouth, with its finely ridged edge and four hairs slanting round. The palpi are articulated laterally to the capitulum. The first segment is short, the second and third have numerous short pectinated bristles, the fourth is much longer and slender, and ends in a conical process. The fifth segment is very short and peg-like, and articulates with the fourth so as to form a kind of pincer.

The first pair of legs are shorter than the others, the fourth pair being longest. This mite does not swim, so there is a complete absence of those swimming hairs to be found on other members of the family Limnocharidæ. It has, however, a very large number of short spines on the legs. At the end of each leg is a double claw. Here the accessory claw so often found in other species is wanting.

The genital area lies between the fourth pair of epimera. There is a fair-sized vulva, and protecting it are two flaps, hinged at their outer edge. Anteriorly each flap is narrow, but increases in size towards the posterior, where the inner portion is cut off obliquely. There are three pairs of acetabula—one at the narrow anterior end and two at the posterior end, which also carries a fringe of hairs. The anus lies midway between the epimeral area and the posterior body margin.

Except for its smaller size, the male is not readily distinguishable from the female.

Thyas venusta has been taken in pools near Edinburgh.

Other Scottish Species of Thyas.

Two species have been taken in Scotland, *T. extendens* George, and *T. truncata* (Neuman). The former I took near Edinburgh, and the latter at Tiree. *T. extendens* may be recognised by the extended form of the capitulum, and *T. truncata* by the very long rostrum.

Limnesia fulgida C. L. Koch.

As a representative of the Hygrobatidæ we may select a fairly common mite, *Limnesia fulgida*, also to be met with near Edinburgh. While we found in *Thyas venusta* a flattened body, we find here one that has the dorsum highly arched and the general body outline oval, without any shoulders such as already noticed. The skin is smooth, without papillæ, but, with a considerable magnification, a fine surface ridging may be detected. Instead of the red of the

Limnocharidæ, we find in the Hygrobatidæ a variety of colours. It so happens that the main colour of *L. fulgida* is red, sometimes it appears there may be traces of an impure yellow or dirty olive-green. On the dorsum there are several dark patches. The more highly chitinised parts, such as the legs, palpi, epimera, and capitulum, are blue, some almost a bluish black.

The eyes also present some differences; instead of being in a capsule, each pair of eyes is separated, the larger eye being the anterior one. This, however, does not hold in general for the group, the paired eyes being usually attached to one another. The antenniform bristles are very fine. A comparison of the epimera of the two species shows a very marked difference. The groups have the same arrangement, but the components are different. The first pair are long and slender, and end posteriorly in a claw-shaped process. On the inner edge, each of the first pair has an almost quadrangular subcutaneous process nearly meeting together on the median line. The interval between the second and third pairs is small. The third pair is very much smaller than the fourth. The third and fourth pairs have at their anterior end a broad process on which a gland pore and bristle will be noticed. Sometimes on that process the margin of the third and fourth pairs becomes indefinite. The capitulum is extended into a short rostrum, at the end of which the mouth is situated. Slightly behind the mouth, the palpi articulate with the capitulum. Most notable is their size, the length being about half that of the body, and their basal members about twice the thickness of the first pair of legs. As is usual, the first segment is very short, the second, however, is in this case about three times as long and is very stout, as indicated above. Along the extensor (dorsal) surface there are two rows of short pectinated spines, the inner row having the larger number. About midway on the flexor (ventral) surface the segment bulges out into a very pronounced tubercle, at the apex of which there is a small chitinous peg. This tubercle and peg supply a reliable key to the identification of the Limnesiad species so far known to Britain. The third segment is smaller, but the fourth is

quite distinct on account of its length and slender form. On the flexor surface in the distal half there are two small protuberances, close together, each with a fine hair at its apex. The fifth segment is small, being little over the length of the first; it is very slightly curved, and has three minute teeth at its apex.

The legs increase in size from the first to the fourth pair. The first three pairs end in claws, but the fourth pair have none. Instead, the ends of the fourth pair are tapered, and have inserted laterally one long bristle near the extremity of the leg. The fourth and fifth segments of the third and fourth pairs of legs have a number of swimming hairs arranged in rows. The other segments of the legs have a number of short spines, and at the distal end of a number of the segments there are a few bristles.

We saw in the genus *Thyas* that sex dimorphism did not occur. In *Limnesia* we find it. Here in the female, as above, we have two plates, one on each side of the vulva. The ends are rounded, and the longer sides are weakly emarginate. Each plate has three acetabula, one at the anterior end and the other two closer together towards the posterior end. Scattered over the plate are a number of hairs rising from small papillæ. At each end of the plates there is a transverse chitinous ridge whose chief function is muscle attachment.

In the male the plates are cordate, and have their inner edges concave. The acetabula are about equidistant from one another, and between them, as in the female, are a number of hairs.

Other Scottish Species of Limnesia.

Five species of Limnesia occur in Scotland. These are noted in the key to identification appended. The first four are frequently met with, and have all been taken in the neighbourhood of Edinburgh. The fifth is not a common species, and has only been taken by me, so far, in a small ditch near Glasgow.

KEY FOR IDENTIFICATION OF SPECIES, BASED ON SECOND SEGMENT OF PALPI.

I. Peg at apex of conical tubercle.
  1. Peg and tubercle directed anteriorly—
    (*a*) Body colour red. *L. fulgida* C. L. Koch.
    (*b*) Body colour yellowish. *L. undulata* (O. F. Müll.).
  2. Peg directed posteriorly. *L. maculata* (O. F. Müll.).

II. Peg directed posteriorly, on inflated distal flexor surface. *L. koenikei* Piers.

III. Peg small, rising directly from flexor surface. No tubercle or inflation present. *L. connata* Koen.

79 MORNINGSIDE DRIVE, EDINBURGH.

Albino Ringed Plover.—On two occasions I saw an albino Ringed Plover on the beach at Cullen. It was first seen on 11th October 1916, and again about a fortnight later. It was with a number of ordinary Ringed Plovers, and in size and behaviour exactly resembled them. The upper plumage was very pale dove colour, the rump white; the black ring round the neck and streak at the eye were present. When in flight with the rest of the flock it looked quite white.—J. GOWAN, The Wakes, Cullen.

Obelia gelatinosa, Pall., in the Firth of Forth.—In a small collection of marine Zoophytes made by the late G. W. Traill, the author of several excellent papers on Scottish sea-weeds, which his daughter, Mrs Forrest, has kindly allowed me to inspect, there is a specimen of *Obelia gelatinosa*, collected by Mr Traill at Joppa, near Edinburgh, in 1891. The species is not in Leslie and Herdman's Catalogue of Firth of Forth Invertebrates, nor has it, so far as I know, been recorded since the date of that list.—WILLIAM EVANS, Edinburgh.

Dwarf Eggs of Birds.—Any species of bird seems to be liable on occasion to deposit an egg very much smaller than the normal size. This has generally been regarded as the first egg of a young bird, but no systematic endeavour has been made on a large scale to investigate the causes and nature of such dwarf eggs. The blank has been filled by an important study on the dwarf eggs

of domestic fowls, by Raymond Pearl and M. R. Curtis (*Journ. Agric. Research*, vol. vi., No. 25, 1916), describing the results of examinations of close on 300 specimens, found during eight years' observation. The rarity of dwarf eggs is emphasised—only one was found for every 1158 normal eggs. The cause of the formation of the eggs seems to lie in a premature stimulation of the glands of the oviduct by an incomplete or broken yolk, or even by a foreign particle, so that the egg-shell is deposited before the contents of the egg are complete. It was found that in roughly a third of the eggs examined, the yolk was altogether absent, while in the remaining two-thirds it was either small or fragmentary.

"The Zoologist."

All British naturalists must deplore the passing away of a familiar and old-established friend in *The Zoologist*, which ceased to be issued with the close of the year. Since its first volume appeared in 1843, *The Zoologist* has held a special place among the few British journals devoted to general natural history, for it has constantly kept in touch with the collector and observer, avoiding the dangers of a too intense specialisation. The result has been that its pages contain invaluable records of the occurrences and habits of British mammals, birds, fishes, crustacea, and other invertebrates, records which, but for its hospitality, would most likely have been lost to science. In its earlier days it was the recognised medium of British natural history, and there are few of the great naturalists who have not contributed to its value. Jonathan Couch, P. H. Gosse, Thomas Bell, H. W. Bates, William Yarrell, Francis Day, Alfred Newton, P. L. Sclater, Howard Saunders, Alfred Russel Wallace, are but a few of the famous names that meet the eye on its pages. The "incorporation" of *The Zoologist* with *British Birds* will greatly restrict its value from a general point of view, for many English records of vertebrates other than birds, and of invertebrates, will now find themselves homeless.

(*Authors are responsible for nomenclature used.*)

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AN OVERLOOKED OCCURRENCE OF THE BLACK LARK IN GREAT BRITAIN.

By William Eagle Clarke.

It has been the custom in this magazine to allude to the occurrences of the rarer animals which have been observed or captured in various parts of the British Isles other than Scotland. Now it is desired to draw attention to an old-time record of a visit of one of the rarest birds on the British list, namely, the Black Lark (*Melanocorypha yeltoniensis*) to Middlesex in or about 1737. This appears to have hitherto escaped the notice of ornithologists, perhaps because it was regarded as an aberration; indeed, Latham, in his *Synopsis* (ii., pt. 2, p. 370, 1783), considered it to be a dusky variety of the Skylark—a conclusion which the writer does not consider justifiable. This interesting account, which predates by 170 years the hitherto supposed first record of this bird's appearance in Britain, is contained in Albin's *Natural History of Birds* (vol. iii., p. 47), published in 1738, and is as follows:—"The Black Lark, Plate 51. The Bill of this Bird was of a dusky yellow; the Irides of the Eyes yellowish. It was all over of a dark reddish brown, inclining to black, excepting the hind part of the Head, on which was some dusky yellowish

Feathers, likewise some Feathers with whitish edges on the Belly. The Legs, Feet, and Claws were of a dirty yellow. This Lark was taken with a Clap Net by one of the Bird-catchers in a field near *Highgate*, and brought to me by Mr *Davenport*, which I have taken care to draw exactly from the Bird, neither adding or diminishing in the Draught or Colouring. This being a Curiosity, I was desired by one of my Subscribers to make a Plate of it." The figure, like all Albin's plates, is crude, but, taken in conjunction with the text, leaves no doubt that the bird was a male Black Lark.

The date of the occurrence is not given, but the Plate has the year 1737 inscribed upon it, a feature not common in Albin's pictures, and probably indicates the year of capture.

The next and only other British record of the Black Lark (the now accepted English name for the species) relates to a small party observed on the coast of Kent and Sussex, in January and February 1907, from which several specimens were obtained.

Albin's account is also interesting since it antedates what has hitherto been regarded as the original description of the bird—that of Forster under the name of *Alauda yeltoniensis* which was published in the *Philosophical Transactions* (lvii., p. 350) in 1767, and was based upon a specimen from Lake Elton, S.E. Russia; which latter locality, along with Turkestan and Western Siberia, form the bird's native land. In winter it wanders, and at that season has visited Galicia, Italy, Belgium, and Heligoland.

Hawfinches and Goldfinches near Musselburgh.—It may be of interest to record that there are, at the present time (February 1917), a pair of Hawfinches in the neighbourhood of Musselburgh. They have been seen several times during the past month. I have also noticed a small party of Goldfinches, five in number, and very large flocks of Linnets, Skylarks, and Meadow-pipits, the first in greater numbers than I ever remember, and the last more numerous than they have been for several years.—Crossley Sykes, Musselburgh.

THE ECONOMIC STATUS OF WILD BIRDS.[1]

By WALTER E. COLLINGE, D.Sc., F.L.S., etc., The University, St Andrews.

FOR some years past there has been evidence of an awakening in the public mind to the importance of the subject of Economic Ornithology, or the status of wild birds in relation to agriculture, horticulture, forestry, and fisheries. This is reflected in the annual newspaper correspondence on the injuries inflicted on farm crops, fruit orchards, etc., by various species of wild birds, in the numerous writings in the agricultural and horticultural Press, and the recent suggestion that our Board of Agriculture should "establish a Bureau of Ornithology, such as has long been at work both on the Continent and in the United States" (*Nature*, 15th October 1915, p. 177). Further, the subject is one of such great importance to all who are interested in the products of the land that I need offer no apology for introducing it before the members of this Society.

As one who has devoted considerable time and means to the subject during the past twelve years, I claim your attention to a rapid survey of the many problems it presents, and its very important bearings on mankind.

The problem is no easy one, and the longer one works at the subject the more complicated does it seem to be, so that one can quite understand Professor Theobald stating that it "is one that can be approached in so many different ways that it is almost impossible to formulate any satisfactory plan of treating this important matter."

On the one hand there are those who would destroy almost every species of wild bird we possess, whilst, on the other hand, the enthusiastic bird-lover would take equally stringent measures to preserve them, exclaiming, "We do not protect birds solely because they are useful, but chiefly

[1] Reprinted from *The Journal of the Royal Horticultural Society*, vol. xlii, part i., by permission.

from ethical and æsthetical reasons, as birds give beauty and animation to Nature. We also wish to preserve their species, and hence the protection of birds signifies the preservation of the monuments of Nature."

As I have elsewhere stated, "the wholesale destruction of birds for the purpose of protecting crops and orchards is, economically, an unsound policy," but the bird-lover is equally wrong in his or her sentimental enthusiasm, and the argument quoted above might quite logically be advanced for the rat, the mosquito, and numerous other obnoxious animals.

In any investigation of such a subject as this, if the results are to be of any value, we must place on one side all sentimental considerations and be guided solely by the conclusions obtained by careful and detailed work extending over a considerable period of time.

Much of the earlier work carried out in this country is very crude; further, many opinions are annually expressed in the Press founded upon insufficient knowledge. The economic status of any particular species of bird can only be ascertained after prolonged and careful investigation by trained and experienced investigators. The setting of senior students in our agricultural colleges and universities to undertake such investigations is hardly likely to further our knowledge; on the other hand, with the semblance of authority, it is very likely to prove misleading.

Bearing in mind the many difficulties that confront the investigator, experience has shown that a very accurate knowledge may be gained of a bird's feeding habits and the nature of its food by the employment of the following methods.

Firstly, it is necessary to examine the food contents found in the whole of the intestinal tract frequently, during the different seasons of the year. The nature of these and their bulk must be accurately identified. The nature of the food brought to the nest by the parents during the breeding season must also be taken into account. "Any investigation on the economic status of most species of wild birds is incomplete, and to a large extent misleading, that does

not deal" with this important matter, "for during the nesting period the food of the parent birds consists largely of insects, slugs, spiders, and worms, and that of the young almost entirely so, and the amount of the food consumed is greater than at any other season of the year."

Secondly, the nature of the fæces, and also of the fæcal matter extruded from the nest, must receive attention.

Thirdly, the rate of digestion of different kinds of food and in different species of birds is another important factor.

Finally, it is all-important that we should have careful observations made in the field.

If the collection of this information extend over the whole of the months of the year and for successive years, and the birds examined be received from many localities in a given district or series of districts, and provided that sufficient care be exercised in the identification of the food materials and their percentages, then I believe that it is possible to arrive at a fairly correct answer to the question, "Is this or that particular species of bird beneficial, neutral, or injurious?"

With regard to these methods, I should like to add a few comments. The examination of the food contents of the intestinal tract is frequently misleading if it cover only a portion of the year or any particular season, for there are species that would appear to be distinctly injurious if the verdict has to be pronounced upon the food consumed by them during the months of July, August, and September, but when the nature of the food for the remaining nine months of the year is also considered a very different result is obtained.

Hitherto it has been the custom to examine the contents of the crop (where present) and stomach, but this is not enough, for in many species of birds, weed seeds and other matter of an indigestible nature pass into the intestine and are not accounted for unless the whole of the intestinal tract is opened and the contents washed out and examined.

In a like manner very valuable results are obtainable from a proper examination of the fæces.

Respecting the rate of digestion, from what little we know by actual experimentation, it is fairly safe to conclude that the majority of birds consume daily a bulk of food equal to $3\frac{1}{2}$-4 times the capacity of the stomach.

Finally, let me, as the result of many years' practical experience, utter a word of caution with regard to field observations. Over and over again have I seen, or read of, hasty conclusions formed, due to lack of experience or knowledge or to imperfect observation.

The question of the economic status of any particular species of bird may, at first sight, appear to be one of only secondary importance, and it is not until we realise the magnitude of the industries connected with the land and the fisheries, that we appreciate how important all economic factors are that bear upon either or both of them.

According to a recent authority, the fishing industry in Great Britain employs upwards of 27,000 vessels, manned by more than 90,000 seamen, who land annually nearly a million tons of fish, valued at some £10,000,000. Excepting that portion destined for curing, the whole of this huge mass of food has to be rapidly distributed over the country, and daily the process is repeated, so that in addition to the actual fishermen we have a small army of packers, coopers, salesmen, hawkers, etc., and to these we may add the large number of railway employees engaged in the transfer.

On all hands we are told that our fish supply could be increased if the fisheries were worked on more scientific principles, in short, if we knew more of the numerous scientific problems affecting them.

With respect to the importance of agriculture, little need be said. "I have always regarded agriculture (in its widest sense)," says the Right Hon. Jesse Collings,[1] "as the chief national concern, and as the only basis on which the real welfare of a country can be securely established. If we have purchased commercial supremacy at the cost of a permanent decay of that great industry, we have bought it at a ruinous price."

[1] *Land Reform*, London, 1906, p. x.

The probable extension of cereal cultivation in the near future, and also that of fruit cultivation, in addition to a large increase in small farms and small holdings, will increase our rural population greatly, so that once again we shall see agriculture taking its proper place amongst the industries of this country, and any factor that makes it difficult to cultivate this or that crop at a profit, will have to be more carefully inquired into than in the past.

We are already told that economic forces will compel thousands of women to enter the fields of agriculture and horticulture at no distant date, and anything that handicaps the large grower will tell with double force against those in a smaller way, and, in most cases, with but small capital.

The question therefore arises, "How does the subject of the feeding habits of wild birds affect these great national industries?" It affects them in three ways, viz.:—

1. In that many species are protected which are distinctly injurious, and as a consequence hundreds of thousands of pounds' worth of food is destroyed by them annually.

2. That many species which are beneficial are destroyed, and so vermin, upon which they largely subsist, exact an enormous toll upon the produce of the land.

3. There are a number of species with reference to which we yet require much more detailed information before it can be decided to which class they belong.

With reference to the first class, there is now a considerable mass of evidence, much of which is founded upon careful scientific investigation. Take, for instance, the case of the rook and the starling. Gilmour in 1896 examined the stomach contents of 355 rooks; Thring in 1910, 141; Florence in 1912, 162; and the writer, 689. Here we have a total, from all parts of the country, of 1347, the cumulative evidence from which goes to show that of recent years there has been a large increase in the numbers of this bird, and with the present large number a grain diet is preferred.

Respecting the starling, we have witnessed an enormous increase during the past twelve or thirteen years, due partly to migration and partly to the protection afforded it. As the result of an extended inquiry in which the stomach

contents of 328 adult birds and 94 nestlings were examined, numerous field observations made, and a careful examination of the fæces, I have no hesitation in stating that for some years to come this species annually requires to be drastically reduced in numbers, and that at present it is a source of considerable financial loss to the farmers of this country.

That gamekeepers, farmers, and others annually destroy large numbers of birds whose food consists largely of voles, mice, rats, and insect larvæ, is common knowledge. Such birds as the kestrel and all the species of owls are far too precious to the farmer to permit the ignorance of a gamekeeper to continue to destroy them wantonly. When we consider that the brown rat alone is annually exacting food to the value of some millions of pounds sterling, it is surely time that such offences as mentioned above were made punishable by more severe sentences. Another striking instance is the lapwing. The value of this bird to the farmer is universally admitted and cannot be overestimated, and yet the apathy displayed by agriculturists in reference to it is pitiful. "Long ago the bird and its eggs should have been more strictly protected than game or any other birds. It is the farmer's best friend, and whilst his crops annually suffer more and more from wireworms and surface larvæ he stands and watches its gradual reduction with indifference."

With reference to the majority of species of birds we do not possess any accurate or detailed knowledge as to the nature of their food, and of quite a large number of common species our knowledge is imperfect.

The need of continued investigation upon a subject so intimately related to our food supply must be patent to even the most casual inquirer, for without a thoroughly reliable and extensive knowledge of the subject it is impossible to frame wise and beneficial laws relating thereto.

In this country we have five Acts of Parliament affording protection to wild birds or relating thereto. One presumes that the main object of these Acts, and the intentions of their framers, were to protect all species that were non-injurious, and also those that were rare. If this were so,

then they have failed hopelessly, for many of our non-injurious species are rarer to-day than in 1880, whilst many other species have become so numerous as almost to constitute a plague to the agriculturist.

These Acts may have been framed with the best of intentions, but there is no evidence to show that those who framed them ever took into serious consideration what would probably be the ultimate effect of such legislation. The farmers, fruit-growers, and probably the fishermen of this country are now suffering, and have done so for some years past, from their effects.

After reviewing these Acts at some length, a recent writer states "that they were all passed, not in the interests of agriculturists of any class, but to satisfy the outcry against bird destruction raised by the bird-loving public at large."

Most people are familiar to a certain extent with the huge flocks of sea-birds that frequent our coasts, but how few have any idea as to what they feed upon! Some are mere scavengers of the shore, devouring anything left by the tide, others travel inland and feed upon different kinds of insect larvæ, some cause considerable damage on game preserves, but the diet of the majority is marine organisms, the bulk of which consists of fish. Very few systematic investigations have been made upon the food of these birds, in consequence of which our information is meagre and often misleading.

In a recent report of an investigation made on the Suffolk and Essex coasts, the committee conclude by stating "that it would be manifestly unfair to draw any definite conclusions from it as to the feeding habits of gulls in general. But since gulls have taken to feeding on grain the balance would appear to be against the gull, and from an economic point of view we consider an exhaustive inquiry is indicated in consequence of the enormous rate at which these birds are increasing throughout the land."

Without thorough and exhaustive inquiry any legislation affecting our sea-birds, or even any wild birds, is both unscientific and likely to prove highly mischievous, and the longer such inquiry is deferred the poorer the country

will be by hundreds of thousands of pounds. Such an inquiry would at least indicate where our present course of conduct is wrong, and would possibly lead to new and more beneficial legislation in the future.

The subject is one that demands constant study and inquiry, for a species of bird that at one period is distinctly beneficial may in a very few years become equally injurious. There are many cases on record of the change in feeding habits due in some cases to a great increase in the number of a particular species and a consequent scarcity of food. In other cases there is an abundance of a particular kind of food, due to artificial cultivation, and the birds have not been slow to avail themselves of the changed condition. Such points as these require very careful consideration in any attempt rightly to estimate the value of any particular species.

Unfortunately, in this country we have no continued systematic study in operation on a large scale. Hitherto the matter has been left to the private individual, but what is now required is continuous work, judiciously planned, and carried out with every care. Such investigations are beyond the means of most: the labour alone of recording and tabulating the results obtained is no mean task. Government action, at the present time, scarcely seems likely, but it might possibly be within the range of practical politics, with some financial assistance from the Development Fund, to found a Chair of Economic Ornithology, in connection with one of our universities, where such work might be carried out. Of one thing I am sure, viz., that it would prove of great scientific interest and of inestimable value to that all-important and increasing community, the food providers of this country.

OBSERVATIONS ON SOME HABITS OF THE COOT.

By Henry Boase.

The following notes on the habits of the Coot are summarised from observations made on the conduct of various pairs which have nested on an island in a small pond near Invergowrie, Perthshire. This pond is without cover, the banks are vertical brick-faced dykes, and its depth varies from about 3 to 12 feet.

Since 1910, when a Coot was seen once only on 9th April, the pond has been under observation, and in the succeeding years a pair have been found to nest annually. As a summer visitor, its first appearances are very irregular, and it is not certain whether the first arrivals are those which subsequently nest. The following are examples of these spring records :—

1912. One, 9th March; away by 23rd March; one, 30th March and on; courting new arrival, 14th April; both gone, 20th April; pair, 27th April, remained and nested.

1914. One, 18th January; gone by 8th February; one, 21st February; two courting, 15th March; one, 26th March; pair, 29th March; one, 4th April; pair, 20th April, remained and nested.

All these may be incoming birds passing through, but there is always a doubt whether these apparent goings and comings refer to the same or to different birds. On the other hand, a pair which turned up on 22nd February 1913 remained and nested and no others were seen, though, in this instance, probably no stranger would have been allowed to remain.

Courting antics have been witnessed once, and other less complete opportunities have confirmed these in the main. On 12th April 1912 two Coots were on the pond, one quite at home on the island, and the other a stranger. The former, apparently a male, seemed greatly excited, and the frontal

plate was expanded, so much so as to be visible from behind, projecting on each side of the head. The male advanced to the stranger, calling repeatedly, with head depressed almost level with the water and bill slightly upturned, but the female showed little interest and mounted on the bank of the pond. The male retired to the island for a few moments and then sallied forth once more, coming over to the side of the pond; but, disappointed with the inattention of the other, returned towards the island calling at intervals and looking back. At last it induced the other, which I took to be the female, to return to the water; but when the male approached, calling excitedly, she again retired to land. After a further swimming to and fro, the male at last induced the female to join him at the island. A little later the two were cossetting or "nibbling" one another about the head, and stroking each other's plumage. Now and again, when the two were feeding apart, one (which, is not certain) would give the loud ringing call, and the other would hurry to it, the two meeting with depressed head and uptilted bill, and they would indulge in further love-making. At other times, instead of stroking or nibbling, the two birds would stop, facing one another, and remain for five to ten seconds with neck arched and bill half immersed in the water. Whether any sound was uttered has not been determined. The enlargement of the frontal plate has only been seen during the excitement of courtship. In early spring, individuals have been seen to strike the courting attitude and give the ringing call when no female was on the pond.

Nest-building does not take place immediately after the pair has settled down, two to three weeks having passed in some cases before any attempt has been made to build. As to the actual date of nesting, the first week of May has been chosen in three out of the six nests seen, once the first week of June, once the first week of July, and once, quite exceptionally, nest-building was in progress on 16th March (in 1913), and incubation was begun the following week. Whether both birds work in building the nest is not clear, but the male, even after the female has begun to sit, seems to be interested in the further supply of nesting material.

As to the materials, so far as could be seen from the bank, twigs were used in all cases, once green stems covered with leaves torn from the overhanging ivy at the end of the pond. The female, when sitting, did not leave the nest when anyone appeared on the bank of the pond, but in one instance the sitting bird was seen to rise from the nest and chase the other to it, which might indicate that both birds incubate, though there is no doubt that the female sits most of the time. As the nests were quite inaccessible, the period of incubation could not be determined with any degree of accuracy.

When the young are hatched, they may not take to the water at all freely during the first week or two. In the case of two of the six broods watched, the chicks remained on the island covered by the female (at least, when anyone was at the pond), and the male brought them food. In other cases the young were swimming about freely the first time they were seen, though it was certain they could only have been hatched a day or two. The young birds were fed frequently, apparently with insects at first, these being picked from the weeds which the parent birds procure by diving, and later, with the weed itself, the young picking at the bunch held at the surface by the adult. A male was watched bringing supplies to the chicks as often as four times a minute. The young ran to meet him at the water's edge, and having been fed one by one, returned to the shelter of the nest where the female was brooding over them. The young have been seen when a little older, but when still retaining all the characteristics of the downy chick, feeding independently on the insect life clinging to the willow stems and brick banks of the pond. When anxious for food, the downy young approached its parent with head depressed and bill uptilted, exactly in the manner of the adult courting, and touched the old bird's beak in order to attract attention. During the feeding, which is interrupted every few minutes for a rest, the young keep up a continual calling.

As may happen in the case of most animals, one or two of the chicks may increase in size more rapidly than the others. In a brood of four hatched in the first days of

August 1916, by the end of three weeks or so, two were almost twice the bulk of the others, and these larger birds were much more anxious for food than their smaller and less importunate fellows. Each adult attended to the wants of one small and one large chick, and sometimes the larger youngster had to be pushed aside to allow the smaller to get a fair share.

When in the down and only a week old, the young can dive if need be, swimming under water with wings and feet. The larger chicks were first seen to dive for food, however, when about five weeks old, by which time the first plumage was beginning to show strongly, and they shared their haul of weeds with their less advanced fellows. Of the two smaller at that time, one was just beginning to show the first plumage, and the other still retained the reddish tint about the head. Six weeks after hatching all the young birds had assumed the first plumage. The disparity in size was still marked, and in the case of the two smaller, the greyish white on the throat and breast was less pure. The parent birds continued to feed them, though the brood were diving freely, and when offered a bunch of weed the young birds called excitedly and hurried to the feast. Feeding was not so frequent now, and the immature birds would sit preening themselves for a quarter of an hour or so at intervals. Two months after hatching, the adults were still providing food for the brood, though three of these were changing to a semi-adult dress and the frontal plate was beginning to show white. At this time (8th October), one adult gave the spring call, the other swam rapidly to it, and the two "nibbled" one another about the head for a few seconds. The following week one of the young still retained the white on the breast, and the others were in plumage scarcely distinguishable from that of the adults, save for the small size of the frontal plate. On this occasion, one of the adults (it seemed to be the male) was very shy, remaining separate from the female and immature birds, which continued to feed unconcernedly, and the following week it was found that one, probably the male, had departed, leaving the other and the four immature birds, all of which seemed wild.

On 5th November the remaining adult had departed, and only three immature birds were left. Later on, in November, a male turned up at the pond (whether the one which had gone is, of course, uncertain), and on 26th November this bird showed the expanded frontal plate and excitement peculiar to the spring.

The foregoing notes are given in some detail, and practically all refer to the 1916 brood. In previous instances, the young departed before assuming the semi-adult dress. In 1913, when nesting took place in March, the young and adults were gone by 5th June, the last (one young and one adult) being seen on 2nd June, the former being in moult to the semi-adult dress. It is perhaps worth mentioning that this stage was reached in about seventy days from the start of incubation, or in forty-four days from the date the downy chicks were first seen, as compared with corresponding periods of about ninety days and sixty-three days in 1916, taking the time, in this second instance, for the most advanced young bird. The margin of error could not be more than five days out or in, and in any case the other broods watched give the longer period on the average, as in 1916. Possibly food supply, which would be more abundant in early summer than later, has some influence in this matter.

The shyness of adults in autumn has been observed on previous occasions in October and November, and it is just possible it may be in consequence of actual or impending moult. In 1916 one of the pair nesting in July first appeared in the end of March and remained, off and on, to the end of May, and was constantly present thereafter. It was therefore under observation from that time until the middle of October, during which period Coot feathers were not seen in the drift on the pond except for a week or two in July when a few contours were noticed, but no more were found after the young were hatched. It seems almost certain, therefore, that this bird must have moulted after its departure.

The parent birds have been seen to fondle the young, stroking them with the bill and rubbing the head against

their down. They will not permit the approach of any strange bird after the young are hatched. An inquisitive Water-hen narrowly escaped with its life when attacked by the enraged pair, and Swans, in spite of their size, were kept well away from the nest and young. Individuals may not be so intolerant of strangers. One March a Pochard came to the pond to feed in the evening, and this duck frequently stole the weed brought up by the Coot without causing resentment on the part of the latter. The Pochard dived freely on its own account but the sight of the Coot, with its hard-earned prize, was always too much for it. Being a faster swimmer than the Coot, it could keep pace with its victim and escape without effort.

The following calls of the Coot have been noticed: a loud ringing "tunk" or "kunk," the usual call note; a louder and more bell-like "kwing" or "kong" used in courting; a cry which might be rendered "tnewt," accompanied by a sharp nod of the head and open beak as though the bird were sneezing; and a "mewing" note, apparently to the young, which does not seem to be often uttered, having been heard by me only once. The call of the downy chick is a rasping "queer" or "creer," and later, a less hoarse "quee-eek" or "quee-eep." Whether both birds utter the "tnewt" note is not clear. On two occasions, once when the pair was returning from the successful repulse of a Water-hen, and once when the adults and their brood were surprised near the bank, one bird has uttered the ordinary call and the other the "tnewt" note.

The food of the adult has been in all cases the weed growing in the pond, but it does not touch the floating growth. Insects, of course, are consumed, these being picked from the surface of the water and even snapped in the air when opportunity offers, and the willow stems and banks of the pond are examined closely for lurking insects. An immature bird has been seen to swallow a willow leaf which it tore from a stem, but this seems unusual.

THE BRITISH LICE (*ANOPLURA*) AND THEIR HOSTS.

Compiled by PERCY H. GRIMSHAW, F.R.S.E., F.E.S.

(*Concluded from page* 17.)

Genus *Linognathus* Enderlein.

Head usually rather slender and elongated. Temporal angles not prominent. Middle and posterior legs nearly equal in size, larger and stouter than the anterior. Abdomen entirely without chitinized tergal, sternal, and pleural plates. Each abdominal segment with two or three transverse rows of hairs. Spiracles large. Gonapods usually long.

From *Artiodactyla* and the Domestic Dog (*Canis familiaris*).

12. *L. ovillus* (Neumann). From Domestic Sheep (*Ovis aries*).
13. *L. piliferus* (Burmeister). From Domestic Dog (*Canis familiaris*).
14. *L. stenopsis* (Burmeister). From Domestic Goat (*Capra ægagrus*).
15. *L. vituli* (Linnæus). From Domestic Cattle (*Bos taurus*).

Genus *Cervophthirius* Mjöberg.

Differing from *Linognathus* only in the sharp posterior lateral angles of the head and the presence of but a single row of hairs upon each abdominal segment.

Recorded only from *Cervidæ*.

16. *C. crassicornis* (Nitzsch). From Red-Deer (*Cervus elaphus*).

Genus *Polyplax* Enderlein.

Antennæ sometimes differing in the sexes, the male frequently having the third segment with a distal, preaxial process. Anterior legs small with slender claw, middle legs larger with stouter claw, posterior legs somewhat larger and with heavier claw than the middle. Female with most of the abdominal tergites and sternites divided into two transverse plates, each bearing a row of spines or hairs. Male with a smaller number of tergites and sternites thus divided. Pleural plates present. Spiracles small.

One species recorded from *Soricidæ*, the remainder from *Muridæ*.

17. *P. affinis* (Burmeister). From Long-tailed Mouse (*Apodemus sylvaticus*).

18. *P. gracilis* (Fahrenholz). From Harvest-Mouse (*Micromys minutus*).[1]
19. *P. reclinata* (Nitzsch). From Common Shrew (*Sorex araneus*).[1]
20. *P. serrata* (Burmeister). From House-Mouse (*Mus musculus*).
21. *P. spiniger* (Burmeister). From Water-Vole (*Arvicola amphibius*).
22. *P. spinulosa* (Burmeister). From Brown Rat (*Epimys norvegicus*), Black Rat (*Epimys rattus*), and Alexandrine Rat (*Epimys rattus alexandrinus*).

Family ECHINOPHTHIRIIDÆ.

Antennæ four- or five-segmented. Legs with a thumb-like process opposing the claw, the anterior pair small with slender claw, the other pairs extremely large with blunt, heavy claws. Abdomen without pleural, tergal, or sternal plates. Thorax and abdomen thickly beset with spines or with spines and delicate scales. Occurring only on marine mammals.

Subfamily ECHINOPHTHIRIINÆ.

Antennæ four-segmented. Abdomen thickly beset with spines but without scales.

Genus *Echinophthirius* Giebel.

Characters of the Subfamily.

23. *E. phocæ* (Lucas). From Common Seal (*Phoca vitulina*).

Subfamily ANTARCTOPHTHIRIINÆ.

Antennæ five-segmented. Thorax and abdomen beset with many stout spines and with delicate scales.

Genus *Antarctophthirius* Enderlein.

Antennæ five-segmented. Anterior legs and claws much smaller than the others, which are extraordinarily large and stout. No sternal plate. No pleural plates. Abdomen and thorax beset with a great number of short, stout spines and with extremely delicate scales. Spiracles small.

24. *A. trichechi* (Boheman). From Walrus (*Odobænus rosmarus*).[1]

[1] Not yet recorded from Britain.

Host List.

Order INSECTIVORA.

Family Soricidæ.

Common Shrew (*Sorex araneus*): *Polyplax reclinatus.*
? *Hoplopleura acanthopus.*

Order CARNIVORA.

Family Canidæ.

Domestic Dog (*Canis familiaris*): *Linognathus piliferus.*

Family Odobænidæ.

Walrus (*Odobænus rosmarus*): *Antarctophthirius trichechi.*

Family Phocidæ.

Common Seal (*Phoca vitulina*): *Echinophthirius phocæ.*

Order RODENTIA.

Family Leporidæ.

Brown Hare (*Lepus europæus*): *Hæmodipsus lyriocephalus.*
Mountain Hare (*Lepus timidus*): *Hæmodipsus lyriocephalus.*
Rabbit, Wild and Domestic (*Oryctolagus cuniculus*): *Hæmodipsus ventricosus.*

Family Sciuridæ.

Squirrel (*Sciurus vulgaris*): *Enderleinellus sphærocephalus.*

Family Muridæ.

House-Mouse (*Mus musculus*): *Polyplax serrata.*
Hoplopleura acanthopus.
Common Long-tailed or Wood Mouse (*Apodemus sylvaticus*): *Polyplax affinis.*
Harvest-Mouse (*Micromys minutus*): *Hoplopleura longula.*
Polyplax gracilis.
Brown Rat (*Epimys norvegicus*): *Polyplax spinulosa.*
Black Rat (*Epimys rattus*): *Polyplax spinulosa.*
Alexandrine Rat (*Epimys rattus alexandrinus*): *Polyplax spinulosa.*
Water-Vole (*Arvicola amphibius*): *Polyplax spiniger.*
Field-Vole (*Microtus agrestis*): *Hoplopleura acanthopus.*

Order PRIMATES.

Family HOMINIDÆ.

MAN (*Homo sapiens*): *Pediculus capitis.*
Pediculus corporis.
Phthirius pubis.

Order ARTIODACTYLA.

Family SUIDÆ.

DOMESTIC PIG (*Sus scrofa domestica*): *Hæmatopinus suis.*

Family CERVIDÆ.

RED-DEER (*Cervus elaphus*): *Cervophthirius crassicornis.*

Family BOVIDÆ.

DOMESTIC GOAT (*Capra ægagrus*): *Linognathus stenopsis.*
DOMESTIC SHEEP (*Ovis aries*): *Linognathus ovillus.*
DOMESTIC CATTLE (*Bos taurus*): *Hæmatopinus eurysternus.*
Linognathus vituli.

Order PERISSODACTYLA.

Family EQUIDÆ.

DOMESTIC HORSE (*Equus caballus*): *Hæmatopinus asini.*
DOMESTIC ASS (*Equus asinus*): *Hæmatopinus asini.*

Tipula vittata, Mg., in the Forth Area.—In last year's volume of the *Scottish Naturalist* (1916, p. 114), Mr Carter reported the occurrence of this crane-fly in Tay, and alluded to previous records from Clyde. As a further contribution to our knowledge of its Scottish range, I may state that I have the following specimens from the Forth area in my collection, namely:—a female taken near Aberdour, Fife, 13th May 1905; another taken on the north bank of the Tyne at Prestonkirk, East Lothian, 13th May 1911; and two (male and female) from side of a stream near Kirkliston, West Lothian, 28th April 1914.—WILLIAM EVANS, Edinburgh.

Occurrence of the Red-necked Grebe in Moray Area.—On one of the northern firths on 30th November 1916, I observed two Grebes which I satisfactorily identified as *Colymbus g. griseigena*. When first seen, the Grebes were cruising along a little way off the shore, the light was excellent, and with the aid of a telescope, it was possible even to distinguish the colour of the iris, while the sooty or dusky brown ear-coverts, sides of the face and loral region, were plainly made out. In winter plumage, when seen at a little distance, the Red-necked and Great Crested Grebes are much alike, but in the Great Crested Grebe, the loral region, the more or less well-defined eyestripe, and the sides of the face are white.

Apparently the Red-necked Grebe has not yet been recorded for Moray area, and, unfortunately, I was not able to obtain a specimen, as the Grebes were shy and kept well out of range of a shot gun.—Annie C. Jackson, Swordale.

Red-necked Grebe in Largo Bay.—On 28th September 1916 we picked up a Red-necked Grebe (*Colymbus griseigena griseigena*) lying dead on the shore in Largo Bay. It proved to be a female; it was in moult, but still retained most of its summer plumage.—Leonora Jeffrey Rintoul and Evelyn V. Baxter, Largo.

Persecution of Rooks by Carrion Crows at Beith.—I sent some notes to the *Report on Scottish Ornithology* for 1913 on the Rooks deserting the rookery at the Manse, Beith, owing to a Carrion Crow visiting the rookery. Last year I had further evidence of their fear of the persecution of the Carrion Crow. When the Rooks began to repair their old nests at Speirs School in the spring of 1916, one of these birds dashed at them and scattered them, with the result that they deserted the rookery. They were also driven from the rookery at Morishill, and on climbing up to four of the nests there, it was discovered that all the eggs in three of the nests had been eaten, and nothing left but small pieces of shell; the other nest had four eggs, two were sucked, one had a hole in it, and one was untouched. Although the Rooks at the Manse were dangerously near the war zone, being only about two hundred and fifty yards away, they successfully reared their single brood. It appears only to be the smaller rookeries which are attacked by Carrion Crows.—John Craig, Beith.

Bittern in the Island of Lewis.—On the 30th of January 1917, a Bittern (*Botaurus stellaris*) was found in an exhausted condition at Carloway, Loch Roag, on the west coast of the Island of Lewis. It was sent to me by the schoolmaster there, Mr M'Donald, and by me to the Royal Scottish Museum. It is the only one known to me as having occurred in the island, though Saunders in his *Manual* states they have been found in the Outer Hebrides.—D. Mackenzie, Stornoway.

[This appears to be the fourth recorded occurrence of this bird for the Outer Hebrides. There are two former records for North Uist (one without date and one about 20th April 1915), and one for Harris, where a Bittern was obtained in January 1890.—Eds.]

Little Gull in the Tay Area.—On 6th October 1916 we saw a Little Gull (*Larus minutus*) on the shore a little to the south of Kingsbarns Harbour (Fife). It was an adult in winter plumage, and in spite of strong west wind and driving rain we had an excellent view of it, first as it stood on the shore among some Black-headed Gulls, and later when it flew past us only a few yards off.—Evelyn V. Baxter and Leonora Jeffrey Rintoul.

Milax sowerbyi in Main Argyllshire. — Mr William Rennie, of Glasgow, has sent me a number of Slugs collected at Kirn on the 4th January 1917, the first molluscan work of the new year, and including a species (*Milax sowerbyi*) which is additional to the Main Argyllshire list (see my paper, *Scottish Naturalist*, September 1916, pp. 229-239). It is also a notable extension of the range of the species northwards, being the most northerly habitat so far known for the western side of Scotland, though on the eastern we have it recorded as far as Aberdeenshire South. This specimen is a very minute young one, though perfectly unmistakable and characteristic. It was with abundance of *Agriolimax agrestis* in both its main forms, var. *pallida* and var. *reticulata*, the latter much predominating, a few *Arion hortensis*, and one exceedingly juvenile, *A. circumscriptus*, all amongst rubbish along the shore beyond high-water mark, partly covered with wrack and exposed to the wash of sea-water. From gardens came abundance of *A. hortensis*, and of *Agriolimax agrestis* var. *reticulata*, which may be regarded as the dark and maculated or winter form, the type form *pallida* being more abundant in summer. From the gardens also was sent a fine adult *Limax arborum* var. *bettonii*, and from the wall of a built-up spring well an exceedingly large specimen of *L. maximus* var. *obscura*; this was very dark in

coloration, with the markings quite obsolete owing to the complete fusion of the inner and main bands; the shield is covered with minute black dots, and there are a few similar dots on the body, especially in a row along each side of the lighter-coloured keel. The two specimens last mentioned I have sent to the British Museum for permanent preservation as being fine and characteristic specimens.

I shall be glad if Scottish naturalists generally would assist actively in working out the range northwards of the slugs, as well as of shelled snails, but slugs have to be sent *living*, in *air-tight* tins, and without food.—W. Denison Roebuck, Leeds.

Diptera from Lewis, Outer Hebrides.—As additional records for the Dipterous fauna of the Outer Hebrides, the following Empidæ, taken by me in the Island of Lewis, in July 1914, may be interesting:—*Empis tessellata*, *E. stercorea*, *Rhamphomyia fumipennis*, *R. variabilis*, *Hilara pilipes*, *Tachista arrogans*, *Tachydromia notata*, and *Hemerodromia precatoria*. All but the last are new to the fauna of the island, while *E. stercorea*, *R. fumipennis*, and *T. notata* are additional species to Mr Grimshaw's list in "Diptera Scotica: vi.—The Western Isles."—C. G. Lamb, Cambridge.

Atomaria procerula, Er. (longicornis, Th.), in Renfrewshire.—According to Dr Fowler (*Coleoptera of the British Islands*, vol. iii., p. 334), the range of this rare *Atomaria* in Britain is limited to three localities in Scotland. A single specimen was taken near Beauly by Mr Crotch in 1866, upon which the species was added to the British list. Another specimen was found by Dr Sharp, near Eccles, Dumfriesshire, in May 1876, and Dr Fowler further mentions that it has occurred at Paisley. With regard to the last record, it is not stated by whom or in what numbers it was found. The species is not represented in the late Morris Young's collection of Coleoptera in Paisley Museum, but it may have been taken by some of the other Paisley collectors. So far as I am aware, no record of the occurrence of the insect in this country has appeared since the publication of Dr Fowler's work, and it is not included among the species mentioned in the list of additional localities contained in the supplementary volume issued in 1913. It may therefore be of interest to note that I found a single specimen under fir bark near Johnstone, in Renfrewshire, during May 1913. According to the last European Catalogue, it ranges from the middle to the north of the Continent, and it also appears to be a rare species there.—A. Fergusson, Glasgow.

Ptilinus pectinicornis, L., at Musselburgh.—Referring to Mr Evans's remarks on this beetle in the Forth District (*Scot. Nat.*, January 1917, p. 20), I may state that I found both sexes in some numbers burrowing in an old paling on the banks of the Esk, just above Musselburgh, on 29th and 31st July 1902. The males were moving about on the surface, but the females remained in the burrows and were difficult to get out. The paling was soon afterwards replaced by a fine new one nicely tarred, much to my regret, as it had supplied me with many interesting insects.—A. E. J. Carter, Monifieth.

BOOK NOTICE.

A Naturalist in Borneo. By the late Robert W. C. Shelford. Edited by Edward B. Poulton. Price 15s. T. Fisher Unwin.

The author of this delightful series of chapters on Natural History in Borneo was Curator of the Museum at Kuching, Sarawak, for seven years. While there he made many expeditions for the purpose of obtaining specimens for his museum, and his keenness of observation and delight in his work are evident to any reader of this book. The chief value of the work lies in the many original observations incorporated therein, and the pleasure of the reader is enhanced by the delightful style and the powers of description possessed by the author. There are chapters on the Bornean Mammals, Birds and Snakes, on the Crocodiles, Turtles, and Tortoises, several on different families of Insects and on Collecting Expeditions, and one on Mr Shelford's special subject of Mimicry. In this last he brings together a most interesting collection of instances in support of the mimetic theory ; many of these are drawn from his own personal observation, and the whole chapter is one of absorbing interest.

This book was written during the author's last illness and was unfinished at the time of his death ; it has been excellently edited by Professor Poulton, who contributes also a biography of the author as an introduction. It is well illustrated by drawings and photographs, and we think that no one who takes it up will be able to refrain from reading it, as speedily as may be, right through to the end. We feel sure that many will share our feeling of regret that one so keen and so evidently full of delight in his work as Mr Shelford, should not have been spared to throw more light on the difficult problems which enthralled him.

(*Authors are responsible for nomenclature used.*)

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BRENT GEESE.

By Abel Chapman, M.B.O.U.

I observe an inquiry by Mesdames Rintoul and Baxter as to the relative abundance in Scotland of the two forms of Brent Geese which have been differentiated as of European and American origin respectively. I feel assured that these accomplished lady ornithologists will forgive my suggesting that no two such forms as are presupposed exist in Wild Nature. The sole basis upon which a pseudo-differentiation has been erected is merely a varying colour-intensity—darker or paler—on the undersides of these Geese. But every wildfowler who has enjoyed personal acquaintance with Brent Geese in Great Britain (as I have done for forty odd years) speedily learns the elementary fact that in every big pack of these Geese, whether on British or Irish Coasts, there are found associated together individuals that display every grade of colour. There are many whose breast-plumage is as dark as their backs; others are almost white beneath; while every intermediate gradation of tone is in evidence. At a single shot one may kill Geese of each and every variety of colour. There are even—though rare—eccentrics who "sport" waistcoats of a rich, warm brown, instead of the customary cold slate-grey. All these are merely individual variations—such as, analogously, one sees

everyday in Red Grouse—and possess no subspecific value. Trinomialists who disagree must erect, not two, but a dozen subspecies.

The original mistake—whence sprang all this confusion—seems to have arisen from an idea that the paler-breasted Brents (now surnamed *Glaucogastra*) emanated exclusively from America. But surely that antiquated myth has, or at least ought logically to have been long ago exorcised. Dozens of travellers in Spitsbergen and Nova Zembla—which are not American—have testified to finding pale-breasted Brents breeding in those lands by the thousand. Personally I can certify that of thirty or forty specimens killed and examined by me in Spitsbergen in 1881, every one belonged to that type. Again, on Kolguev, still further east, Mr Trevor-Battye found both forms assembled together side by side in tens of thousands. All these facts have been recorded. How is it that, in scientific ornithology, concrete statements such as these should be set aside—as it were contemptuously—while other records (some of which appear to me little better than childish) should be cited again and again?

Witness p. 25 *suprà*. Quoting the B.O.U. List of British Birds—and let me speak of that with all due respect, having been a member of the Union for thirty-two years—the Brent Goose is stated to be "a winter visitant, numerous in the Shetlands"; but a few lines later we read, "Other Authorities, however, state that the Brent Goose is scarce in Shetland." There is something rather pathetic in this spectacle of "Authorities" who, while instructing us as regards the Geese on the other side of the world, beyond Greenland's icy mountains, are yet quite uncertain as to elementary facts in their distribution in home waters. The instance, however, is quite symptomatic of modern scientific ornithology.

Whether Brent Geese frequent the Shetlands in winter or not, I cannot personally state; but those rocky islands appeared to me (in a single spring visit thereto) about the last places on earth in which I should expect to find them wintering. It is quite a minor point, and could be settled by any competent wildfowler in half a season, or less.

All facts respecting the distribution and plumage-variations in Brent Geese—so far as these are yet ascertained—will be found set out in full detail in M. Serge Alpheraky's fine monograph, *The Geese of Europe and Asia*—my copy of which work I place most gladly at the disposal of your two contributors.

My own conclusions are as follows :—That all the millions of Brent Geese which in winter throng our British estuaries, from the Cromarty and Dornoch Firths right round the east coast to the Solent—and equally those of Ireland—are all of European origin, bred in Spitsbergen, Kolguev, Nova Zembla, or eastward thereof; or, alternatively, should any Brents of American origin cross the Atlantic and herd with these (though no evidence exists of such movement), that there does not exist a human being who could discriminate between the Transatlantic and the Cisatlantic individual.

[Both *A Hand-list of British Birds* by Hartert, Jourdain, Ticehurst, Witherby, and the *List of British Birds* by a Committee of the B.O.U. divided the light from the dark-bellied Brent. Following their lead, we intended to differentiate the forms in our Topographical Avifauna of Scotland : there now appears to be considerable doubt as to whether these are really two subspecies or only dimorphic forms. On reading the above interesting paper by Mr Abel Chapman, we wrote to ask Dr Hartert what his opinion was, and he replied as follows :—" I can only separate two forms of Brent Goose, i.e., *Branta bernicla bernicla* and *Branta bernicla nigricans*. Both forms" (*i.e.*, light and dark-bellied) "breed together on Spitsbergen and Kolguev, and also many intermediate ones. The two supposed forms are also found together in the same flocks in winter. These forms cannot therefore be subspecies (*i.e.*, geographical representatives). It is said (if true) that in America all Brent Geese have light undersides, but these light ones are indistinguishable from the light ones from Europe, where they are as common as the dark ones. We can therefore only say that two varieties (with intermediates) occur in Europe, while in America only one is said to occur ; but I am not so sure if the darker form would not be found

as well if special attention were paid to the question in America. Among insects we have many cases in which species occur in two forms in one country, in one of the latter alone in other countries.

"The name *glaucogastra* has been erroneously applied to the light-bellied form. Brehm under that name (*Handb. Naturg. Vög. Deutschl*, p. 849) distinctly describes the grey-bellied form (from the Baltic). Also Brehm's name *micropus* applies to the grey-bellied variety, but his *Bernicla collaris*, *Isis*, 1830, p. 996 (*nomen nudem!*) *Handb. Naturg. Vög. Deutschl*, p. 851 (1831, coasts of Pomerania) is the light-bellied form. The supposed *B. b. nigricans* from the *eastern* U.S. might possibly be dark-bellied *bernicla*. *B. b. nigricans* is not known—as far as I know—to occur in Great Britain."

It will be seen from the foregoing that Dr Hartert's views agree closely with those of Mr Chapman, and considering the opinions expressed by these two leading ornithologists, we think we cannot do better (at any rate till more evidence be forthcoming) than treat the light and dark-bellied forms merely as varieties. We should, however, still appreciate direct evidence of the occurrence and numbers of either from any part of Scotland.—L. J. R. and E. V. B.]

Brent Geese, both dark and light-breasted, in the Forth, etc.—With reference to the article by Misses Rintoul and Baxter in the February number, I can vouch for the occurrence of both dark-breasted (or bellied) and pale-breasted Brent Geese in the Forth. It is my impression, however, that, while birds in the light phase of plumage seem to predominate now, the dark or typical phase was the usual one in my younger days. Unfortunately I have not many definite records bearing on the point, but such as I have support my general recollection. Thus, a specimen "shot on the Firth of Forth" in the winter of 1875-76, and another near Kincardine-on-Forth in February 1879, are both dark plumaged, as was also a single bird watched for a considerable time feeding in Aberlady Bay on 26th September 1889. An adult female in my collection, shot from a flock of ten at Longniddry Bay, East

Lothian, on 28th February 1891, is likewise a dark-plumaged bird. The others were, I believe, similarly coloured; had they been otherwise, I would almost certainly have made a note of the fact. The first occasion on which I noted pale-bellied birds here was in February 1895. On the 9th of that month I had an excellent view, with the aid of binoculars, of ten Brent Geese standing at the tide-edge a short distance east of South Queensferry. As the entry in my diary states, all had light underparts except one, which was dark underneath. Specimens obtained during the last ten years that I have examined have invariably been the light "form." In February 1912 several were shot near North Berwick, Aberlady, and Dunbar. One of these—a male from Aberlady Bay—secured by Mr O. H. Wild, is, I understand, the pale-breasted bird from "Firth of Forth" referred to in Misses Rintoul and Baxter's article. A similar female, shot on 3rd February 1912, as it rose from a ditch on a farm near Yetholm, Roxburghshire, is in Mr J. W. Bowhill's collection. Mr Bowhill has also two—both pale-bellied birds—from the Moray Firth about ten years ago. The late Robert Gray possessed a Brent Goose from the River Tay, 10th February 1879, which he regarded as the "Atlantic form though somewhat dark." This, I presume, is the pale-breasted example from the Tay recorded by Misses Rintoul and Baxter. Of course both "forms" vary to some degree, but I can only recall one specimen which could properly be said to be intermediate.

It is somewhat significant that the figures of the Brent Goose in the works of most of the earlier writers on British birds (Willughby, Pennant, Graves, Yarrell, and possibly others) clearly represent the dark-bellied form.

Whether these dark and light "forms" of Brent are to be regarded as subspecies (geographical races) or as merely phases of one dimorphic species, such as we recognise in the case of the Arctic Skua and the Fulmar, is perhaps a debatable point. For my own part I have always inclined to the latter view. Both forms are stated to occur in Spitsbergen, Nova Zembla, and Taimyr Peninsula; and I cannot think birds of American origin are likely to be regular and abundant winter visitors to the east coast of Scotland.—William Evans, Edinburgh.

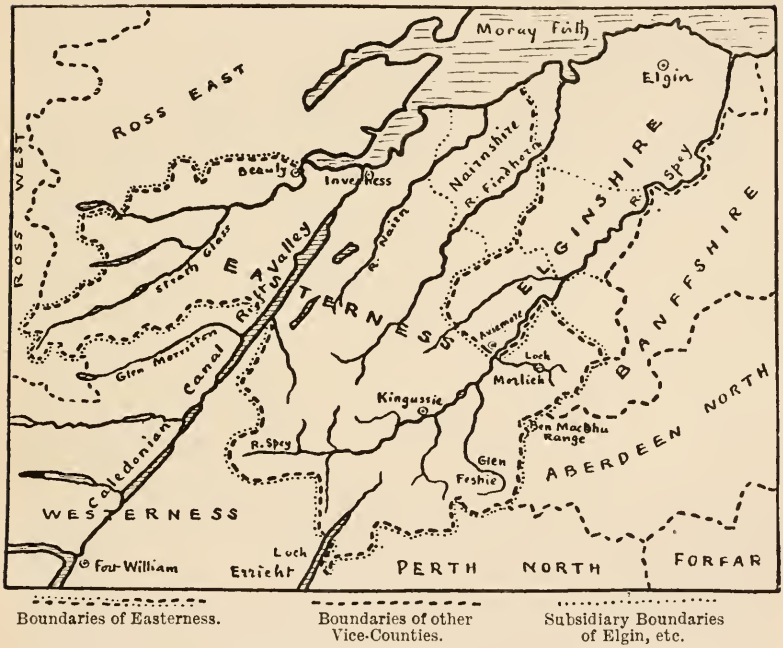
Recovery of Black-headed Gulls marked in Scotland.—Having mentioned the English-bred birds of this species which have been recovered whilst nesting in Scotland (*Scot. Nat.*, December 1916), and also the others recovered in Scotland (*Scot. Nat.*, February 1917), perhaps it would be of interest to enumerate the recoveries of those actually bred and marked in Scotland under the *British Birds* scheme, as mentioned in my article in that publication, vol. viii., pp. 215 and 217. Of birds marked at *Loch Durisdeer*, *Dumfriesshire*, there were three recoveries; one went south-east to Darlington where it was found eight months later; another north-east to Perth, one month, and the third due north to Paisley, also one month later. *From Penpont*, *Dumfriesshire*, there have been six recoveries. All occurred in the parent county or the neighbouring counties of Northumberland, Cumberland, Lanark, and Kirkcudbright within eight months, four of them within six weeks of marking, Of birds marked on *Loch Spynie*, *Elgin*, there have been four returns. One of these birds went due north, being recovered in Orkney, five months later. Two were found in the parent county four years and two months and one month later, the fourth occurring in Aberdeenshire two months after marking. Since the article was published two more recoveries are recorded in *British Birds*, vol. x., p. 223. The first was marked at *Cleuchhead*, *Dumfriesshire*, in July 1912, and was recovered near the breeding ground of Penpont in the same county in June 1916, and was in all probability nesting there. The second was marked on the *Castle Loch*, *Wigtownshire*, in June 1916, and was recovered in Northumberland in September 1916, three months after marking.—H. W. Robinson, Lancaster.

Birds killed by Oil at St Andrews in 1915.—For a few days before 21st June 1915, a quantity of crude oil was noticed on the sea at St Andrews, and a great number of sea-birds and land-birds were killed by it. The chief sufferers were Guillemots and Razorbills. On 28th June I buried 269 Guillemots, 6 Puffins, 2 Eider and one young; on the 29th, 4 more Guillemots and 2 Solan Geese came ashore. By the 30th, some of the Gulls which had gone inland to escape from the oil were beginning to return to the shore. On 1st July 162 Guillemots were found, also one Puffin and one Herring Gull; a good number of other birds were found dead—Starlings, Sparrows, Rock-pipits, and Wagtails. The oil stuck to them like bird-lime.—A. Brown, Gatty Marine Laboratory, St Andrews.

ELGIN: THE VICE-COUNTY AND ITS MOLLUSCAN FAUNA.

By W. Denison Roebuck, M.Sc., F.L.S.

The vice-county of Elgin is not quite the same as the political or civil county of Elgin, although it includes all the territory which either is now or has been within the past



Sketch-Map of Easterness and Elginshire Vice-Counties.

hundred years Elginshire. The cause of this is the changes made in the political county in 1870, the conchological and botanical vice-county remaining as it was defined by Mr Hewett Cottrell Watson.

To illustrate this point I reproduce the sketch-map given in my paper on Easterness. Here it will be noticed that dotted lines divide the vice-county into three areas.

Mr Watson defined vice-county 95, Elgin, as "including the detached portion of Inverness-shire which separates the two portions of Elginshire." By the change of 1870 the two lower areas were transposed as regards their comital status, the southern portion being transferred from Elginshire to Inverness-shire and the intervening or middle one from Inverness-shire to Elginshire.

As modern maps do not show this, and older maps may be considered as now inaccessible, it will be convenient for me to state the boundaries of the vice-county as traceable on Sheets 74 and 75 of the One-Inch Ordnance Survey Map.

The western boundary, beginning on the coast, is that of Nairnshire as far as its southernmost angle at Carn Glaschoire (2162 feet). From this point the dotted parish boundary, equivalent to the watershed, is followed. Proceeding south-west it passes over Carn Loisgte, and leaving Lochan Odhar (Easterness) on its west, it ascends to the summit of Carn nam Bain-Tighearna, and then descends the slope to cross at Slochd Mor (1189 feet) the road and the Highland Railway. It then ascends the opposite slope to the summit of Carn na Lair (1957 feet), and thence over that of Carn Phris Mhoir (2021 feet), and as far as an angle where it turns sharply to the east to follow the ridge of Carn Coire na Caorach (2071 feet). Thence it goes south-east over Sguman Mòr (2037 feet), and then descends the slope of Creag Shoilleir to the Dulnan River at the point marked 1161 feet. It then follows that stream and its tributary Allt nam Moircach for about half a mile; thence up the slope to the summit of Geal-charn Beag (2425 feet), and over the 2250 feet height to the summit of Carn Dearg Mòr; thence down the slope and up again to Creag na h-Iolaire; thence across the northern end of Lochan Dubh, and thence first up and then down the slope of Craigellachie. It then crosses first the road and then the railway to the River Spey at the small island opposite Corrour. Here the dotted parish boundary is left, and our boundary becomes the Spey River itself down to the point where it is bridged for the Great North of Scotland Railway. It then follows the railway and

then the road east-south-east to the Duack Burn; thence south-east up this burn to the ford where a smaller burn comes in on its right bank; thence up this smaller burn and through the Abernethy forest, and over the height marked 1086 feet to the bridge across the River Nethy near Forest Lodge. Thence up the slope to the summit of Carn à Chnuic (1658 feet); thence past the southern end of Loch à Chnuic and south-south-east up the slope to the summit of Carn Bheadhair (2636 feet); thence across the summit of Càrn Tarsuinn (2490 feet), and down to the nearest bend of the Water of Caiplich, which is the western boundary of Banffshire. This boundary, to be found on all maps, is then followed northwardly to the sea beyond Fochabers.

The vice-county, as thus defined, is by no means a natural area, including as it does only the mouths and lower courses and some of the tributaries of two large rivers, the Findhorn and the Spey, which have their sources far beyond the limits of Elgin. It is mostly moorland and hill pasture, with cultivated land about Elgin and along the sea coast; and there is a good deal of woodland throughout, including parts of the Abernethy forest. The heights are not great, reaching along the southern border to those whose altitudes I have stated in tracing the boundary. It possesses about thirty miles of low and sandy sea-coast, including on the west the famous Culbin sands.

The district has not been much worked for a number of years, but it is classic ground as being the scene of the labours of the famous and accomplished naturalist, the Rev. Dr George Gordon of Birnie, whose Fauna of Moray, of which the molluscan portion was published in 1854 (*Zoologist*, May 1854, xii., 4312-4314; September 1854, xii., 4424; and October 1854, xii., 4453-4462), was a worthy and noble pioneer of similar work in northern Scotland. For the purpose of this list Dr Gordon defined his district as the Province of Moray and equivalent to the drainage basins of the Beauly and the Spey; but so far as land and fresh-water mollusca are concerned, judging from the localities he cites, the area of his list was practically the low-lying region within easy reach of Elgin town. He acknowledged

assistance from Mr Macdonald, Mr Martin, Mr J. Shand, Mr Patrick Duff, and Mr Murray, who are therefore, with himself, the pioneers of this branch of natural history in the county. The list includes fifty-two species.

Beyond this list there has been but little published. Dr Buchanan White, in his Scottish list (*Scot. Nat.*, 1873, ii., 166, 167, 208), has a few references Dr Jeffreys in the *British Conchology* of 1862 has numerous references, and Mr Rimmer in 1880 had one.

The second list to be published was the one by myself in my "Census of Scottish Land and Freshwater Mollusca" (*Proc. Roy. Phys. Soc. Edin.*, 1889-90, published 1891, x., 437-503), in which I give localities for forty-eight species.

The material upon which the following list is based is the work of very few observers. Indeed it is entirely the work of the Rev. George Gordon and Mr William Evans, with just a few additions by the Rev. J. E. Somerville, the Rev. G. A. Frank Knight, and Mr Charles Oldham.

It was a great source of pride and pleasure to me to be placed in communication in 1890 with the veteran Dr George Gordon, who spared no trouble to enable me to see specimens both from his own collection and from the Elgin Museum; and I am indebted to my ever staunch friend, Mr William Evans, F.R.S.E., for this introduction, and also for the sight of the numerous shells collected by himself in the higher reaches of the district, at Aviemore, Nethy Bridge, Grantown, Cromdale, etc., and recorded by me in *Ann. Scot. Nat. Hist.* for 1892 and 1893.[1] In 1887 we had a single record from the Rev. J. E. Somerville; in 1910 two or three from Mr Charles Oldham, F.Z.S., who never forgets the Census of Mollusca, and lately I have seen one or two from the Rev. G. A. Frank Knight, M.A., F.R.S.E.

On the eve of publication of this paper I have been in communication with Mr H. B. Mackintosh, F.S.A.Scot., of

[1] Some of the "Aviemore" records may really belong to Easterness; *cf.* footnote on p. 282 of *Scot. Nat.* for Nov. 1916; but the rule in cases like this, where more precise localisation is not given, is to consider records as appertaining to the vice-county in which the place named is itself situate.

Redhythe, Elgin, the Hon. Secretary of the Elginshire Literary and Scientific Association, who has most kindly interested himself in the subject. He courteously sent me for inspection three tablets of specimens from the museum which we had not previously examined, and has also caused consignments of living slugs to be sent me, whereby two species were added to my list. He also interested others in the subject, and I am indebted to Mr William Ogg for a consignment of living slugs and snails, half a dozen species, from the gardens of Duffus House.

Limax maximus.

Grantown, August 1891, var. *fasciata* (W. Evans).

Limax cinereo-niger.

Nethy Bridge, in pine woods, July 1887, one (J. E. Somerville); Cromdale, 25th August 1891, one var. *ornata*, three-quarters grown, and one var. *luctuosa*, a quarter grown (W. Evans).

Limax flavus.

Elgin, South College Garden, 10th December 1890, var. *flavescens*, two fine adults (G. Gordon).

Limax arborum.

Below Grantown, Strathspey, 4th August 1891, var. *nemorosa*, two (W. Evans); Castle Roy, near Nethy Bridge, August 1891, var. *nemorosa* (*id.*); Cromdale, 21st August 1891, several adult and nearly so (*id.*); Cromdale, 25th August 1891, type, very pale, several nearly adult (*id.*).

Agriolimax agrestis.

Elgin, gardens, 4th December 1890, var. *reticulata*, numerous (G. Gordon); Elgin, South College Garden, 10th December 1890, four, dark brownish (*id.*); Castle Roy, near Nethy Bridge, August 1891 (W. Evans); Grantown, August 1891, var. *reticulata* (*id.*); Duffus House, gardens, 20th February 1917, var. *reticulata*, great abundance of young and a few adult (William Ogg); gardens, Lesmurdie, 21st February 1917, var. *reticulata*, small, numerous (Mr Smart per H. B. Mackintosh); gardens, Gordonstoun House, Elgin, same date (H. B. Mackintosh).

Agriolimax lævis.

Lesmurdie, gardens, 21st February 1917, a few, young, gathered by Mr Smart (H. B. Mackintosh).

Arion ater.

Below Grantown, Strathspey, 4th August 1891, one, fine adult

(W. Evans); Cromdale, 21st August 1891, one, adult (*id.*); near the Old Heronry, on the Findhorn, 7th September 1891, one, fine adult (G. Gordon).

Arion subfuscus.

Below Grantown, Strathspey, 4th August 1891, adults fine and numerous (W. Evans); Cromdale, 21st August 1891, one, nearly adult (*id.*); Aviemore, May 1893, one (*id.*).

Arion hortensis.

Duffus House, gardens, 20th February 1917, numerous, young (William Ogg); Lesmurdie, gardens, 21st February 1917, several, young, gathered by Mr Smart, the gardener (H. B. Mackintosh).

Arion circumscriptus.

Elgin, gardens, October 1890 (G. Gordon); Elgin, gardens, 4th December 1890, two, very young (*id.*); Castle Roy, near Nethy Bridge, August 1891 (W. Evans); Grantown, August 1891 (*id.*); Cromdale, near Grantown, August 1891 (*id.*); Aviemore, 6th October 1910, one (C. Oldham); Duffus House, gardens, 20th February 1917, a few young, one adult (William Ogg).

Arion intermedius.

Elgin, garden, 4th December 1890, one, adult (G. Gordon); Castle Roy, near Nethy Bridge, August 1891 (W. Evans); Grantown, August 1891 (*id.*); Cromdale, 21st August 1891, two, small and pale, and 25th August 1891, one, adult (*id.*); Aviemore, May 1893, two (*id.*); Aviemore, October 1910, type and a few var. *grisea* (C. Oldham); Duffus House, gardens, 20th February 1917, one adult (William Ogg); Lesmurdie, gardens, 21st February 1917, one, young (H. B. Mackintosh).

Vitrina pellucida.

Near Elgin (G. Gordon, 1890); Castle Roy, near Nethy Bridge, August 1891 (W. Evans); Grantown, August 1891 (*id.*); Cromdale, near Grantown, August 1891, several (*id.*); Aviemore, May 1893 (*id.*); Duffus House, gardens, 20th February 1917, one, young (William Ogg); Lesmurdie, gardens, 21st February 1917, one, small (H. B. Mackintosh).

Hyalinia cellaria.

Near Elgin (G. Gordon, 1890); Cromdale, near Grantown, August 1891, one (W. Evans); Lesmurdie, gardens, 21st February 1917, one (H. B. Mackintosh).

Hyalinia alliaria.

Near Elgin (G. Gordon, 1890); Castle Roy, near Nethy Bridge, August 1891 (W. Evans); Grantown, August 1891

(*id.*); Cromdale, near Grantown, August 1891 (*id.*); Lesmurdie, gardens, 21st February 1917, one (H. B. Mackintosh).

Hyalinia nitidula.

Near Elgin (G. Gordon, 1890); Duffus House, gardens, 20th February 1917, numerous (William Ogg).

Hyalinia pura.

Near Elgin, var. *margaritacea* (G. Gordon, 1890); Aviemore, May 1893 (W. Evans).

Hyalinia radiatula.

Near Elgin (G. Gordon, 1890); Cromdale, near Grantown, a few, August 1891 (W. Evans); Aviemore, August 1893 (*id.*).

Hyalinia crystallina.

Near Elgin (G. Gordon, 1890); Aviemore, several, May 1893 (W. Evans).

Hyalinia fulva.

Near Elgin (G. Gordon, 1890); Aviemore, May 1893, one (W. Evans).

Pyramidula rotundata.

Near Elgin (G. Gordon, 1890); Aviemore, May 1893, one (W. Evans); Duffus House, gardens, 20th February 1917, abundant (William Ogg).

Acanthinula aculeata.

Cothill on the Findhorn (G. Gordon, 1890).

Acanthinula lamellata.

Aviemore, May 1893, one (W. Evans).

Helix aspersa.

Elgin, in garden, 4th December 1890, one, young (G. Gordon).

Helix hortensis.

Near Elgin, var. *lutea* (12)345 *arenicola*; one, adult, var. *lutea* 1(23)(45); one, young, var. *lutea* 00300; one, adult, dead and bleached to chalky-white; one, var. *lutea* (12345) *interrupta*, with bands brown and blotchy; one, adult, var. *lutea* 00000; one, adult, dead, var. *lutea* 12345, one with bands brown but regular; and two dead, one of these last becoming 123(45) at mouth (G. Gordon and Elgin Museum, November 1890); the Elginshire specimens labelled *Helix nemoralis* in the Elgin Museum, the tablet of which Mr H. B. Mackintosh has been kind enough to send me for inspection, are all this species, as follows:—var. *lutea* (12345), bands accentuated at intervals, one adult; var. *lutea* (123)(45), bands dark brown, one young; var. *lutea* 12345, bands brown, distinct, one adult; var. *lutea* 12345 *arenicola*, one adult; var. *lutea* 00000, two adults, one of them bleached and dead.

Helicigona arbustorum.
Elginshire, locality not stated (G. Gordon, 1890).

Hellicella caperata.
Elginshire, with vars. *ornata* and *major* (G. Gordon, 1890); Inverugie, three, small (*id.*, 4th May 1892).

Hygromia fusca.
Aviemore, May 1893, one, young (W. Evans).

Hygromia granulata.
Banks of the Findhorn (G. Gordon, 1890).

Vallonia pulchella.
Burghead (G. Gordon, 1890); Castle Roy, near Nethy Bridge, August 1891 (W. Evans).

Ena obscura.
Cothill on the Findhorn (G. Gordon, November 1890).

Pupa cylindracea.
Near Elgin (G. Gordon, November 1890).

Pupa muscorum.
Elginshire, near the sea (G. Gordon, 1890).

Vertigo antivertigo.
Lesmurdie Cottage, near Elgin (G. Gordon, 1890).

Vertigo pygmæa.
Near Elgin (G. Gordon, 1890); Castle Roy, near Nethy Bridge, August 1891 (W. Evans).

Sphyradium edentulum.
Cromdale, near Grantown, August 1891, a few (W. Evans); Aviemore, May 1893, one (*id.*).

Balea perversa.
Near Elgin (G. Gordon, 1890).

Clausilia bidentata.
Near Elgin (G. Gordon, 1890); Aviemore, May 1893, one, small (W. Evans).

Cochlicopa lubrica.
Near Elgin (G. Gordon, 1890); Castle Roy, near Nethy Bridge, August 1891 (W. Evans); Grantown, August 1891 (*id.*); Cromdale, near Grantown, August 1891, several (*id.*); Aviemore, May 1893, a few (*id.*).

Carychium minimum.
Near Elgin (G. Gordon, 1890).

Succinea putris.
Near Elgin (G. Gordon, 1890); Aviemore, May 1893, several young (W. Evans).

Limnæa truncatula.

Near Elgin, var. *minor*, two (G. Gordon, November 1890); Aviemore, May 1893, one (W. Evans).

Limnæa palustris.

Loch of Spynie, two (Elgin Museum, November 1890).

Limnæa peregra.

Near Elgin, several (Elgin Museum, November 1890); about Elgin, numerous, with var. *ovata* (G. Gordon, November 1890); about Elgin, a small lacustrine form, numerous (*id.*); Balnagath, near Forres (*id.*); Cromdale, near Grantown, August 1891, two (W. Evans); Nethy Bridge, Speyside, abundant (G. A. Frank Knight, November 1916).

Limnæa auricularia.

Near Elgin, a few (G. Gordon, November 1890).

Aplexa hypnorum.

Loch of Spynie, four (Elgin Museum, November 1890).

Planorbis glaber.

Near Elgin (G. Gordon, November 1890).

Planorbis crista.

Duffus, vars. *lævigata* and *imbricata* (G. Gordon, 1890).

Planorbis spirorbis.

Loch of Spynie (G. Gordon, 1890).

Planorbis contortus.

Loch of Spynie (G. Gordon, 1890).

Planorbis fontanus.

Loch of Spynie (G. Gordon, 1890).

Segmentina nitida.

Elginshire, a few on tablet in the Elgin Museum, which Mr H. B. Mackintosh was good enough to send me for inspection.

The known range of this species in Britain, which has never been authenticated from localities further north than Yorkshire and Lancashire, and has not been reported in Scotland except for Roxburghshire, makes the interest of this record very great; Mr Mackintosh assures me that the specimens seen by us from the museum were of the Elginshire series of Dr Gordon's collecting; the specimens on the tablet are old, and some of them have been accidentally destroyed.

Ancylus fluviatilis.

Near Elgin, several (G. Gordon; also Elgin Museum, November 1890); Cromdale, near Grantown, August 1891, one (W. Evans); Aviemore, a few, May 1893 (*id.*).

[*Vivipara vivipara.*

We have seen, through the kindness of Dr G. Gordon, the original specimen recorded in his Moray list of 1854 from the mouth of the Findhorn; it was evidently a ballast-shell, being bleached, much worn, and broken; and of course is no component of the Fauna of Elgin.]

Unio margaritifer.

Elginshire (G. Gordon, 1890); River Spey, Nethy Bridge, two (G. A. Frank Knight, 1911).

Anodonta cygnea.

Elginshire (G. Gordon, 1890).

Sphærium corneum.

Elginshire, numerous (Elgin Museum, November 1890); near Elgin, var. *gibbosa*, with type (*id.*); near Elgin (G. Gordon, November 1890).

Pisidium fontinale.

Near Elgin, numerous (G. Gordon, November 1890).

Pisidium pulchellum.

Near Elgin, Alex. Robertson (Elgin Museum, November 1890).

Pisidium pusillum.

Near Elgin (G. Gordon, November 1890).

Pisidium nitidum.

Near Elgin (G. Gordon, 1890).

Pisidium milium.

Near Elgin (G. Gordon, November 1890).

The list—as given above—is an authenticated one, extracted from the Record-books of the Conchological Society of Great Britain, every record being vouched for by the inspection of specimens by the referees, Mr John W. Taylor, M.Sc., the author of the splendid *Monograph of the Land and Freshwater Mollusca of the British Isles*, which is now in progress of publication, and myself for the Slugs which constitute my own special study.

The list includes eleven slugs, twenty-nine land and twenty freshwater snails—sixty species in all, or eight more than in Gordon's list of 1854.

The museum at Elgin is to be congratulated upon possessing the local collections of Rev. Dr Gordon, and it may be considered as containing the greater part of the material upon which this list is based.

Of the deficiencies, we may fairly expect to add *Zonitoides nitidus* and *Planorbis albus*, which appear in Dr Gordon's list.

We ought also to expect *Punctum pygmæum*, which we have had from just over the border, in the neighbouring county of Banff. A few of this species, collected on 15th August 1891 by Mr W. Evans at Ballindalloch Castle, along with one *Hyalinia nitidula*, a few small *H. alliaria*, several *H. crystallina*, a few *H. pura* var. *margaritacea*, two *H. fulva*, a few *Carychium minimum*, and one small *Vitrina pellucida*, were recorded by myself for this county (*Ann. Scot. Nat. Hist.*, July 1893, pp. 168-169), but in error, the locality turning out to be in Banffshire.

Of the problems for solution, it is desirable to ascertain whether *Helix nemoralis*, which has not been authenticated for Kincardineshire, either vice-county of Aberdeenshire, Banffshire, nor Easterness, nor any vice-county north of them, actually occurs in Elgin, as implied rather than directly stated in the Fauna of Moray by Dr Gordon. His specimens now in the museum are all of the allied species, *H. hortensis*, in his time looked upon as merely a variety; but in his "Fauna" he writes of *H. nemoralis* and var. *hybrida* occurring at Burghead, thus raising a point as regards the investigation of that locality. Living specimens should be collected and examined for the character of the dart, to ensure due accuracy. It is desirable also to ascertain if *Hygromia hispida*, whose northern limit seems to be about the same as that of *H. nemoralis*, occurs, Dr Gordon's list only including *H. sericea* (*granulata*).

I shall be pleased to see living consignments of these, also of slugs, and for this purpose my address is 259 Hyde Park Road, Leeds.

Murchison of Taradale Memorial.—An important bequest of great interest to all Scottish students and naturalists has been made by the will of the late Miss A. F. Yule, daughter of the late Sir Henry Yule. We learn from *Nature* (11th January 1917) that the birthplace of Sir Roderick Murchison, the house and grounds of Tarradale or Taradale in Ross and Cromarty, are left in trust "to be preserved for ever to the use and enjoyment of my countrymen under the style and title of the Murchison of Taradale Memorial." The wish is expressed in the bequest that the house, with its fine library of more than 20,000 volumes, and all its other contents, should become "a place of rest and refreshment for poor scholars or other students, preferentially, but not exclusively, those no longer young," and preferably also of Scottish birth or descent. This place of rest is to be kept open all the year round, unless limitation of funds necessitates closure for several months. The grounds surrounding Taradale House, it is desired, are to form a sanctuary or reserve for the preservation of the wild life of the Highlands, more especially for wild birds, and the trustees may lend the house to one or more of the Scottish universities for scientific research over a limited period, exclusive of experiments on living animals. The whole residue of the estate, apart from a few small legacies to servants and others, is left to the trustees to form a maintenance fund to carry out the objects of the trust. Funds in excess of the scheme, if any, are to be used to establish "Murchison of Taradale Memorial Bursaries" at any of the Scottish universities or places of secondary education in Scotland or elsewhere, for the assistance of young natives of Ross-shire of either sex of any age between fourteen and twenty-four, preferably those able to write and speak the Gaelic language.

European Forms of the Cormorant.—In *Novitates Zoologicæ* (xxiii., pp. 293-295 and 318) Dr Hartert discusses the forms of *Phalacrocorax carbo*, of which only one had hitherto been accepted by the ornithologists of the present day. He finds that there are evident differences in size and colour among adults, and that it is easy to recognise two distinct forms which may be separated as follows:—

1. *Phalacrocorax carbo carbo* (Linnæus).—Generally larger, with larger bill, and underside deep blue-black. This form is a native of the North Atlantic, from Nova Scotia to South Greenland, Iceland, Faroes, British Isles, coasts of Norway, and east to the Kola Peninsula.

2. *Phalacrocorax carbo subcormoranus* (Brehm).—Smaller, with smaller bill; underside steel-black, with a distinct greenish gloss. This smaller form is a native of Central Europe, north to the Baltic, west to Holland and coast of France, south to the Mediterranean, the Danube Valley, Black Sea basin, and eastwards to Central Asia.

Dr Hartert remarks that it will be interesting to compare adult British specimens, especially British-bred birds, with a view to finding out if both forms occur. Some of the specimens he has examined seem to be intermediate, others indistinguishable from *subcormoranus*, but most adult breeding birds, and probably all, belong to *carbo*.

The Light-bellied Variety of the Brent Goose in Fife.—With reference to the paper just published in the *Scottish Naturalist*, it may be of interest to record that I saw at close quarters a Brent Goose of the light-bellied form on 3rd February 1917. It was swimming about just off the rocks below Cambo, between Kingsbarns and the East Neuk. I got within twenty yards of it, and by waving my arms induced it to fly; but it only flapped to a rock about the same distance away, and stood there, so I had an excellent view of it. This tameness, so unusual in a Goose, leads me to think that it had been damaged in some way, or was feeling ill. Miss Baxter, who was with me, helped me with the identification of this interesting visitor.—Magdalen Erskine, Cambo.

On the Capture of a Meadow-pipit by a Common Gull.—It may be of interest to record that on 13th June 1916, as I was crossing some open moorland, four adult Common Gulls passed me in full chase after a Meadow-pipit which was dodging and vainly trying to escape its pursuers; they, however, rapidly gained on it. Eventually, the Meadow-pipit dropped exhausted into some long heather, but the foremost Gull pounced upon it, and when last seen, was carrying the unfortunate Meadow-pipit away in its bill.—Annie C. Jackson, Swordale.

Notes on the Recovery of Ringed Birds.—In *British Birds*, vol. x., No. 9, Mr H. F. Witherby gives a short account of some of the results of ringing Song-thrushes, Blackbirds, Lapwings, and Woodcock. Of these, he deals only with those

ringed as nestlings and recovered in winter, and although he wisely refrains from drawing any conclusions, owing to paucity of material, one or two interesting points are indicated. Severe weather is suggested as a reason for some of the movements of these partial migrants from Britain, but here again lack of material prevents any positive statement being made. One point which we think worthy of notice is the number of birds ringed in Scotland, as nestlings, and recovered in Ireland; far more seem to leave this country for Ireland than is the case in England. This is specially striking in the case of the Lapwing, fourteen Scottish birds being recovered there, and only five English ones. Of the Song-thrushes ringed in Britain exactly half of those recovered were found at home and half abroad. The proportion of Blackbirds which left the country is smaller, being only 28 per cent. of the recoveries. In both these species, birds ringed as nestlings were recovered the next summer at, or near, the place of their birth. In the Lapwings recovered 57 per cent. of those ringed in England left the country compared with 82 per cent. of the Scottish birds. Of this species and the Woodcock, Ireland would appear to be the commonest wintering-place.

Migration in Banffshire.—An interesting migration movement was observed here on 20th December 1916; it was, no doubt, occasioned by weather, as it occurred during our first spell of really wintry weather. Along the shore, an irregular stream of birds was seen coming over the cliffs from the east, and flying out over the sea to the west towards Portknockie, thus taking a short cut across the bay. The greater number of the birds were Fieldfares; others, smaller, were probably Redwings; one Blackbird flew near enough for identification, and a number of Song-thrushes were hopping about on the braes, and some on the rocks, where as a rule there are none, at this season. There were several small flocks of Starlings, of twenty or so, and a few Skylarks—later a large flock of Skylarks, about seventy, passed over, and an equally large flock of Snow-buntings: the last-named did not fly out over the sea. There were three small parties of Wood-pigeons of from five to ten, two Golden Plovers, and a dozen or so Curlews straggling along at a lower level over the sea beyond the rocks. These all passed during a quarter of an hour or twenty minutes, between noon and 12.30. Next day there was nothing more to be seen, and the Song-thrushes on the braes had gone, only two remaining, and at Portknockie only three Song-thrushes and one Fieldfare

were seen on the top of Scaurnose Point, towards which the birds were flying. It would be interesting to know whether any movement was observed elsewhere on the same day.—J. Gowan, Cullen, Banffshire.

Hen-harrier in Fife.—On 17th January 1917, an adult male Hen-harrier (*Circus cyaneus*) flew close over my head at Balhousie, about two miles north of Largo. There had been frost, and the ground had been snow-clad for some days previously, while the wind had been in some northerly quarter. The bird passed within fifteen yards of me as I stood beside a strip of trees, so I had an excellent view of it. This species is not common in Fife, this being the first time I had seen it in this part.—Evelyn V. Baxter, Largo.

Notes on the Plumage, etc., of the Little Bustard.—Dr Hartert has some interesting notes on this species in the recently issued number of the *Novitates Zoologicæ* (xxiii., pp. 337-339). These relate to the structure of the wing, the moults, and a new racial form.

The wing formula differs in the sexes, and is highly peculiar in the male, in which the fourth primary is decidedly shorter than the third and fifth, its outer web is much contracted in the middle, while the inner web is contracted in its basal half and is abruptly wider in the middle. The result is that when the bird is on the wing, a small gap is likely to appear, and this may account for the piping note alluded to by observers.

The annual moults differ from those of other palæarctic Bustards, since the male is strikingly different in his summer and winter dress: the latter is assumed by a complete moult after the breeding season, the former by a partial moult affecting the head and neck, which become lavender grey and black and white respectively. The adult female has only one moult at the end of summer, and her plumage is alike at all seasons.

Dr Hartert finds that there is an Eastern race in which the birds are darker, less sandy, and less reddish, and the markings as a rule are coarser. This he has named *Otis tetrax orientalis*. It is a native of Western Siberia, Afghanistan, Turkestan, and westwards through Transcaspia and Southern Russia to Rumania, Greece, Austria, and South Italy, and breeds occasionally in East Central and Mid-Southern Europe.

Work done by the Watchers' Committee of the R.S.P.B. in Scotland in 1916.—An interesting account of the work done by the Watchers' Committee of the R.S.P.B. is issued in the winter number of *Bird Notes and News*. In almost every locality mentioned, an increase of the rare species, which these Watchers guard so carefully, is noted. The Scottish reports are probably of most interest to readers of our magazine, and here it is gratifying to be able to report from Shetland "particularly good news . . . of the Great Skuas." Further, "In the Orkney area, Phalaropes seem increasing in numbers every season, and a great many different kinds of birds hatched off; all seem getting more plentiful." The Gannet nested for the first time on Noss, and from Shetland one Watcher says, "No eggs were taken this season. The Fulmar and all the others are doing well." All this is evidence of the excellence of the work done by these Watchers towards the preservation of our rarer breeding birds.

Tadpole-fish on the Coast of East Lothian, Firth of Forth.—On 10th February (1917) I found a Tadpole-fish (*Raniceps raninus*) on the shore about a mile and a half east of Port Seton, East Lothian. It was being washed in by the tide, and though in a somewhat battered condition was still sufficiently fresh to admit of my taking it home for detailed examination. The length was almost exactly 9 ins., and the peculiar smell alluded to by Day (*British Fishes*, i., 321) was distinctly noticeable. There are only four or five previous records of this curious fish for the Firth of Forth, the last being from Largo Bay, Fife, by Misses Rintoul and Baxter in this magazine for 1912, p. 68.—William Evans, Edinburgh.

Note on an Apparently Rare British Wood-louse (Ligidium hypnorum, Cuv.).—The genus *Ligidium* was founded by Brandt[1] in 1833, and up to the present time some dozen or more species have been described.

Only a single species is known to occur in the British Isles, the *Oniscus hypnorum*, of Cuvier. Described by the great French anatomist in 1792,[2] this species was very imperfectly understood until placed by Brandt in a separate genus—*Ligidium*. Unfortunately, Brandt changed the specific name, and it was not

[1] *Bull. Soc. Nat.*, Moscow, 1833, vol. vi., p. 174.
[2] *Journ. d'hist. nat.*, 1792, vol. ii., p. 19.

until 1871 that the Cuvierian specific title was restored by Budde-Lund.[1]

It is known to have a wide distribution on the European Continent, having been recorded from France, Germany, Sweden, Denmark, and Turkey.

It was first recorded for the British Isles by the Rev. T. R. R. Stebbing, who, in 1873, described it under the name of *Zia saundersii*, from the neighbourhood of Copthorne Common, Surrey.[2] Nothing more was heard of the species until 1906, when Webb and Sillem[3] announced its discovery at Warley, in Essex, in the spring of 1902.

In 1910 I obtained two examples from beneath the moss on a pot of orchids in a conservatory at Bowdon, Cheshire, and in the following year I collected it beneath moss overgrowing stones on the banks of the river Bollin, between Bowdon and Ashley Mills. Finally, in 1912, I obtained two further specimens at Henley-in-Arden, Warwickshire.[4]

In spite of careful and persistent search by myself and fellow workers, it has not since been recorded.

There is the possibility that this species has been mistaken for *Philoscia muscorum*, Scopoli, adults of both species averaging 9 mm. in length. It can, however, be readily separated from *P. muscorum* by the multiarticulated flagellum of the antennæ, the large oval eyes, which extend down the sides of the cephalon, the more fragile and longer uropoda, and the narrower and more elongated form of the body generally.

There is no reason to suppose that this species is restricted to the above-mentioned localities, and there seems to be so many likely localities in Scotland, that I am anxious to direct the attention of Scottish naturalists with a view to a diligent search being made for it during 1917.

The most likely habitat is beneath moss and herbage near lakes and streams, or on marshy ground.

I will gladly identify and return (if desired) any specimens forwarded to me. — Walter E. Collinge, The University, St Andrews.

Unio margaritifer in Easterness.—This species should have been included in my paper on "Easterness" (*Scot. Nat.*,

[1] *Naturhist. Tidssk.*, 1871, vol. vii., p. 226.
[2] *Ann. and Mag. Nat. Hist.*, 1873 (s. 4), vol. xi., p. 286.
[3] *The British Woodlice*, p. 21.
[4] *Journ. Econ. Biol.*, 1913, vol. viii., p. 8.

May 1916, pp. 107-113), specimens having been obtained by Mr William Evans from the River Spey at Kincraig, by Kingussie, about 1890 or before; and I have just seen a single valve from the Spey in the Rev. G. A. Frank Knight's collection. I trust there will be further additions to the Easterness list.—W. Denison Roebuck, Leeds.

Diptera in a Forfarshire Garden.—In continuation of my previous notes, some account of the flies observed in my garden during the past year may be of interest. The season was remarkable for absence of sunshine, low temperature, and heavy rainfall. As a result, insects of all kinds were fewer in number, both of species and individuals. *Merodon equestris*, F., so plentiful formerly, was seen only once or twice, and not a single example of *Pachymeria femorata*, F. (cf. *Scot. Nat.*, 1916, p. 12), was noticed; *Metopia leucocephala*, Rossi., was also absent. On the other hand, two species were taken which I had not found previously in Scotland. (1) *Macrocera fasciata*, Mg., a ♂ of this pretty Fungus Gnat, on 5th September. As a Scottish insect, it has been recorded only from St Kilda (*Ann. Scot. Nat. Hist.*, 1907, p. 151). (2) *Chrysotoxum festivum*, L., a fine ♂ emerged, to my surprise, from a trowelful of earth which I had placed under a bell-jar to serve as a pupating nidus for the "Slugworm" of the pear-tree. This was in July; on 9th September I netted another ♂ over a bed of annual chrysanthemums. Troon appears to be the only recorded Scottish locality for this species. Other interesting flies were: (3) *Pipiza luteitarsis*, Zett., two males on 21st May; (4) *Melanophora roralis*, L., which occurred in somewhat greater numbers than formerly. It has a habit of running on stems of trees, vibrating its wings the while. (5) *Stevenia maculata*, Fln., which also occurred more plentifully than in previous years. A male found, 13th August, on my study wall, away from the window, had but newly emerged—the ptilinum being distended, the wings unexpanded, and the whole creature colourless. How did it get there? I could find no trace of a puparium. (6) *Mycophaga fungorum*, Deg., three females on my study window, 14th July, 23rd August, and 4th September respectively; particularly pleasing captures of this rare fly which I have not met with since I took it at Musselburgh in 1902 and 1906.—A. E. J. Carter, Monifieth.

[Mr J. W. Bowhill has shown me a specimen (male) of *Chrysotoxum festivum* which he caught near Aberlady, Haddingtonshire, on 31st July 1911, W.E.]

(Authors are responsible for nomenclature used.)

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THE PROBLEM OF ADAPTATION.

To any student of animal life it is clear that, as a whole, animals are remarkably well fitted each for its own particular surroundings and mode of life. The question has often been asked, by what means this more than casual fitness has come about, and one of three answers has been the rule. One type of mind sees nothing for it but that each creature must have arisen as it stands, a perfect and finished work of art. The more modern points of view hinge round two different aspects of the problem of an adaptation gradually reached through stages of natural evolution. To the one, nature, that is to say the external environment, is the chief agent in the process, continually cutting off the possessors of such variations as do not help to reduce the discord between an animal and its surroundings, so that in the end the well-adapted animals are just those which have been spared. In this view, which depends mainly on the trivial variations universally present in living things, the importance of the animal organism as a directive force is reduced to a minimum. To the other view the organism itself is the main controller of its evolution: new needs and new desires bring new adaptations in their train.

In these two views, the one negative, the other positive, as regards the animals' activities, are typified two modes of

regarding animal structures which have appealed in particular to zoologists, and have tossed zoological science to and fro for many a year. The history of the rivalry between the competing claims of a science which would view animal structures as things in themselves, morphological units to be studied separately, and one at a time, and one which would regard structures as but the concrete embodiment of the functional activities of animals is admirably given in Mr E. S. Russell's recent volume on *Form and Function*.[1] Here he sketches, with insight, the constant variations of stress in the science of animal structure, from form pure and simple, to form as a resultant of life activity. The positions of the leaders of both schools are restated ably and freshly, and one is reminded in the reading, of the wave of reaction which is setting in against the excesses to which description of specimens has been carried; as if many words made for completeness or finality. Descriptions can scarcely be final or satisfactory until structure is regarded as more than an efflorescence in three dimensions, and pure description is ameliorated by interpretation.

In addition to these two predominant modes of regarding animal adaptations—the functional or synthetic, and the formal or transcendental—Mr Russell distinguishes a third, the materialistic or disintegrative—an attitude which regards living things as no more than the mechanical result of the interplay of the physical and chemical constituents of their bodies. It is true that biologists have still much to learn regarding the application of the recognised laws of nature to the interpretation of adaptations, and no one doubts that animal structures are subject to the physical and chemical necessities which govern other mundane things; but this after all only explains part of the story of life. The materialistic view is clearly not Mr Russell's. Like many modern workers he favours the view that animals are, in part, of their own making, and many a reader of his interesting study of the swing of the pendulum of zoological investiga-

[1] *Form and Function: A Contribution to the Study of Animal Morphology*, by E. S. Russell. London, John Murray, pp. viii.+383. Price 10s. 6d. net.

tion between pure and interpretive morphology will hope and feel that he has, by setting the facts in perspective and evaluating them, given a fresh impetus to the investigation of animal structures and adaptations looked on as results of experiments in living.—J. R.

The Brent Goose in Bute.—So far as I am aware no record of the Brent Goose in Bute has yet been published. In the Bute Natural History Museum there are three specimens, all of the pale-breasted form, labelled respectively, "Rothesay Bay, 1910"; "Ardmaleish, April 1910"; and "Rhubodach, April 1910." These three localities are on the east side of the island, between Rothesay and the Kyles of Bute. In all of these specimens the breast is very pale, and the white patches on the neck are small, separated in front by quite an inch. Indeed, when these birds are looked at from directly in front the white patches are not visible. Prior to this winter these are the only records for this species in Bute that I know.

On 22nd December 1916, during the severe frost, I came on a flock of eight Brents on the shore at St Ninian's Bay, on the west side of the island. Many writers, including Payne-Gallwey, have described the Brent as being extremely wild, and never going on land except when wounded, but these birds were grazing on marshy ground well beyond the high-water mark, and were distinctly tame, allowing me to walk within a hundred yards of them, and examine them through a telescope. They walked in a compact flock, grazing quietly, and taking little notice of me, except to walk in the opposite direction. I spent some time trying to get within gunshot, but there was very little cover, and when I went too close to them they always rose and flew slowly for a distance of a hundred yards or so. I came to the conclusion that I could not get them, and fired at a turnstone, but even this did not drive them away. Finally I succeeded, after half a dozen attempts, in getting behind a rock just within shot, and fired as they rose. Two of them came down, one at the edge of the tide, which I got without any difficulty, but the other one a considerable distance out to sea, and I did not get it till a few days later when I found it dead on the shore.

I heard some weeks later that a small flock of these birds was seen on Onich Loch, near St Ninian's Bay, about this time, by one

of the keepers, so apparently they are not always such exclusively marine birds as they are commonly said to be.

All of these birds which I saw were of the dark-breasted form, *Branta bernicla*. At the suggestion of Mr O. H. Wild, Mr Wm. Evans kindly examined one of the birds for me, and says that there is no doubt as to the variety. This bird is being placed in the Bute Museum. The white patches on the neck, in both my specimens, almost meet in front, and the underparts are practically as dark as the back.—J. M. M'William, Craigmore, Bute.

The Status of the Brent Goose in Orkney and Shetland.—I read with great interest Mr Abel Chapman's article on the Brent Goose in your last issue, and was glad to find that he criticised the first part of the statement made in the new B.O.U. list that it is: "A winter visitor, numerous in the Shetlands and Orkneys and on the east and south coasts of Great Britain." Following this we read where it is less numerous. So stated, readers naturally infer that it is most numerous in Great Britain, "in the Shetlands and Orkneys and on the east and south coasts of Great Britain." Mr Chapman's surmise is correct, it is extremely rare in Shetland and Orkney, so much so that local wildfowlers cannot name it from a skin. The only record I could find of the occurrence of the Brent Goose in Orkney was of three captured in Stromness Harbour many years ago, and shown to me for identification by a local gentleman who had had them stuffed as extremely *rarœ aves*. They were nothing but skin and bone when captured, he told me, and no wonder, as there is no suitable food for Brent among such rocky islands, as Mr Chapman suggests. I also venture to suggest that the species is dimorphic. I spent several winters in Orkney but never saw a Brent in the flesh.—H. W. Robinson, Lancaster.

[Messrs Harvie-Brown and Buckley in their *Fauna of the Orkney Islands* do not seem to regard the Brent Goose as very uncommon there (see p. 167), and in Messrs Evans and Buckley's *Fauna of the Shetland Islands*, the Brent is stated to occur only on passage (p. 130).—Eds.]

WHALES STRANDED ON SCOTTISH COASTS IN 1916.

In the *Report on Cetacea Stranded on the British Coasts during* 1916, by S. F. Harmer, Sc.D., F.R.S., six are reported cast up on the shores of Scotland, of which it seems fitting that full record should be made in this magazine. By far the most interesting of these was the Killer or Grampus (*Orcinus orca*) procured at Colvend, Kirkcudbright, on 23rd May, of which Dr Harmer says: "The individual reported from the Solway Firth on 23rd May is the first recorded in these Reports, and is of special interest in more than one respect. It was unfortunately incomplete, the tail being missing, and, although its full length cannot thus be stated, it can hardly have been less than 30 ft. . . . The length of the lower jaw (from the condyle to the anterior tip) is 3 ft. $2\frac{3}{4}$ in., and the specimen thus appears to have been one of the largest on record.

"In addition to the lower jaw, which had twelve teeth on each side, the dorsal fin, both pectoral fins, several bones, and two photographs of the entire animal were received. One of the photographs shows that the specimen was a male. The fins were of enormous size, the dorsal fin being 5 ft. 6 in. long, and the pectoral fins being 6 ft. 8 in. long and 3 ft. 7 in. in breadth, thus largely exceeding in absolute size the flippers of an adult male Sperm Whale. I am indebted to Dr Knud Andersen for having called my attention to the observations of Lütken ('Kritiske Studier over nogle Tandhvaler,' vid. *Selsk. Skr.*, 4 Bd., No. VI., p. 367) on the very remarkable alterations which occur in the fins of the male Killer during growth to its full size. According to these observations, the pectoral fins of young males, and of females of all ages, are relatively small and weak, their length being about one-ninth of the entire animal. In the males, however, 'all the fins, the caudal and dorsal fins as well as the flippers, grow relatively larger with age,' and 'the difference between the small and weak pectoral fins

of the younger animal and the huge, long, and broad flippers of the old male is perfectly astonishing,' the length of the flippers in the adult male being only about one-fifth that of the entire animal. Lütken believes that in the old females the flippers decrease relatively in size, and that really large flippers and other fins are only known in old males. The failure to realise the existence of these remarkable changes has led to the description of individuals of this species under more than one specific name.

"It need hardly be pointed out that the facts observed in the Solway Firth specimen are entirely in agreement with Lütken's description. It may be added that the enormous growth of the flippers in this specimen has been produced by a very striking increase in size of the cartilaginous parts of the phalanges and carpal elements, the ossified parts having grown relatively little during the hypertrophy of the fin.

"It is probable that the female Killer never reaches much more than half the length of the largest males, a disproportion between the sexes which is paralleled in the Sperm Whale."

A Lesser Rorqual (*Balænoptera acutorostrata*), cast ashore at North Berwick, on 26th August, was determined from blades of the baleen, and another procured at Caithness on 18th October, "had lost its head, tail, and flippers, the part stranded being 20 ft. long. It appears to have been a large though not fully adult specimen of this species, as indicated by the characters of a lumbar vertebra, from which the epiphyses had been lost."

Bottle-nosed Whales (*Hyperoodon rostratus*) were recorded from Carnoustie (Forfar) and Grimsay (Outer Hebrides). The former was described as a male, and was determined by an old Dundee whaler, who examined it in the flesh and said that he "could not mistake it with its peculiar head"; the complete head of the latter was secured. A Common Porpoise (*Phocæna phocæna*) secured at Montrose on 10th March completes the list of Scottish Cetacea for the year.

The Report deals further with twenty-three specimens stranded on the shores of England, Ireland, and Wales.

These comprise seven Porpoises, one Common Dolphin, one White-beaked Dolphin, one White-sided Dolphin, three Bottle-nosed Dolphins, one Bottle-nosed Whale, one Sowerby's Whale, one Cuvier's Whale, one Sperm Whale, one Common Rorqual, and two Lesser Rorquals. Space does not allow us to do more than refer briefly to the more interesting of these occurrences, namely :—

A Cuvier's Whale (*Ziphius cavirostris*), on the Cornish Coast, on 7th June, and believed to be the first of its kind recorded for England.

A Sowerby's Whale (*Mesoplodon bidens*), from Lincolnshire, on 7th September.

A White-sided Dolphin (*Lagenorhynchus acutus*), on the coast of Mayo, on 9th June.

A young Sperm Whale (*Physeter catodon*), with uncut teeth and presumably a "sucker," stranded on the coast of Galway, on 4th September. It was 18 feet long.

Pale-breasted Brent Goose in Ayr, Renfrew, and Bute.—The Brent Goose comes annually in considerable flocks, varying in size up to 500 birds or a little more, to Fence and Poteath bays, near Fairlie. I first made the acquaintance of the bird at this locality twenty years ago. The birds seen that season (from the beginning of January to early March) all belonged, I considered, to the pale-breasted form. I was then, and have been since, on the watch for the dark-breasted form as well, but I have not recognised it yet, nor do I know of its occurrence, anywhere in "Clyde." As mentioned by Misses Rintoul and Baxter in the February number of the *Scottish Naturalist*, p. 26, I saw a solitary example of the pale-breasted form at Balgray Dam, East Renfrew, on 1st January 1911. In the Bute Museum, Rothesay, are three examples, which I have seen, from Port Bannatyne, Island of Bute ; these also are pale-breasted.—John Robertson, Cathcart.

Light- and Dark-breasted Brent Geese.—I have just been reading Mr Abel Chapman's paper, in the *Scottish Naturalist*, on Brent Geese, but I cannot agree with his conclusions as to the two races. Speaking entirely of the Humber, I find the two races always arrive separately and do not associate except when feeding, when all the flocks become mixed on account of the small extent of

feeding ground among the reaches of hard ground on the Humber flats. When flushed they always separate again.

There seems to have been a change in the Brent Geese that visit us here. In the old days when the Brent was a regular winter visitor, they were almost all dark-breasted birds, and I only occasionally saw a small party of light ones. Nowadays Brent do not often appear, and when they have done so are light-breasted birds. In February 1912 a flock of about a hundred frequented the muds about Tetney Haven; these, with the exception of a party of seven, were all light-breasted. The seven dark birds always kept separate, and, if feeding on the same mud bank, always went off alone when put up.

This year we were visited by a good many flocks of white-breasted birds in January, but not a single dark bird appeared till the first week of March, when a small party of nine came in, followed later by two or three still smaller parties. These never joined the flocks of white-breasted birds, but remained separate till they left in the end of March. Some white-breasted birds remained when I left Lincolnshire on 31st March.

I have killed a good many of these birds, and I have examined dozens killed by the professional punt-gunners, and have never seen a bird that could not at once be referred to one or the other race. I have seen the brown-breasted birds mentioned by Mr Chapman, but they all belonged to the dark race. I do not say that intermediate forms do not occur, but I have not met with them on the Humber.

The bird figured in the plate in Count S. Alpheraky's work as *B. glaucogastra* does not represent a typical example, and I do not think I have ever seen a bird like it. It seems to me that these two forms deserve sub-specific recognition at least as well as some that have received it.—G. H. Caton Haigh, Grainsby, Lincolnshire.

The Status of the White-fronted Goose in Orkney.—The White-fronted Goose is stated in the new B.O.U. list to be "rather plentiful in the Shetlands and Orkneys." I spent several winters in Orkney but never came across the species, although I heard that it sometimes was shot on the spring migration, but at long intervals.—H. W. Robinson, Lancaster.

SOME NUDIBRANCHS, INCLUDING *HERMÆA DENDRITICA*, AND *LAMELLIDORIS ASPERA*, FROM THE FORTH AREA.

By WILLIAM EVANS, F.R.S.E., and LIEUT. W. EDGAR EVANS, B.Sc.

AS on land, so in the sea, there occur molluscs having shells and those without them; that is, snails and slugs. The scientific name for the sea-slugs is Nudibranchiata or, as some prefer it, Nudibranchia. For delicacy of form and colour, the group can lay claim to some of the most beautiful of nature's productions. Sixty to seventy years ago the British species were investigated by Alder and Hancock, whose exquisite coloured drawings, illustrating their famous 'Monograph,"[1] have ever since been the delight of marine zoologists.

Many of Alder and Hancock's specimens were obtained on the north-east coast of England, and thus at no great distance from where the coast-line of the Forth area begins in the south. According to the recent supplement to the "Monograph" there are 125 species, or thereby, now known from British waters. Of these only some twenty-nine or thirty at most—equal to no more than half the Clyde list—have been recorded from the Firth of Forth,[2] a number which doubtless falls considerably short of the actual Nudibranch fauna of the area. In the present paper we record two additions to the list, namely, *Hermæa dendritica*, A. and H., and *Lamellidoris aspera*, A. and H., both recently obtained in the course of some promiscuous shore-collecting—a clear indication of what a systematic search for this group of molluscs might be expected to yield.

During the spring of 1915 a small sea-water aquarium was fitted up by one of the writers (W. E. E.), in our house

[1] "Monograph of the British Nudibranchiate Mollusca," *Ray Society*, 1845-1855; Supplement by Sir C. Eliot, 1910.

[2] For references to literature, see paper by W. E. in *Proc. Roy. Phys. Soc. Edin.*, xvii., pp. 37 and 38.

at Morningside, Edinburgh, and to this circumstance the majority of the following records are due.

Hermæa dendritica, A. and H.—This dainty little species interested us more than any other Nudibranch met with. Not only is it an addition to the local list, but some apparently fresh facts regarding its life-history have been ascertained. The first specimens we noticed were three in a glass dish containing various small seaweeds brought from rock-pools on the coast east of Port Seton, Haddingtonshire, 27th May 1915. One of them was transferred to a test-tube in which it deposited, during the few days it survived, a coil of spawn on a piece of *Ulva lactuca* placed beside it. In about ten days the larvæ or "veligers" began to hatch out. When fully extended this specimen was only 6 mm. in length, and the others were much the same size, perhaps if anything less. On 21st August of the same year a much larger example—length 11 mm.—was found on a plant of the beautiful feathery seaweed, *Bryopsis plumosa*, from a rock-pool at the east end of Gullane Bay. It also deposited some coils of spawn, and observation showed that it was feeding on the *Bryopsis*. On this food it lived till 4th October, when, the supply having meantime failed, it died, apparently either from starvation or old age. Though various other algæ—green (*Cladophoræ*, *Ulva*, etc.), red and brown—were placed in its dish it would touch nothing but *Bryopsis*, of which even a piece taken from a herbarium specimen and moistened was not neglected. Doubtless the three examples got on 27th May are to be accounted for by the fact that *Bryopsis* was among the seaweeds then brought home. In 1916, a tuft of the *Bryopsis*, brought from Joppa rocks, near Edinburgh, on 25th July, was found to be inhabited by a number of very young Hermæids, which, as was expected, proved to be *H. dendritica*. They were then scarcely 2 mm. in length, with few dorsal papillæ or cerata (five pairs in a specific case), and short broad, somewhat crenate ear-like tentacles (rhinophores); but they rapidly grew into the adult form, and by 1st September, though no more than 6 to 7 mm. long, had been spawning for a week. Concurrently with the decay of the food plant all had died

off by 10th September. Four days after these young examples were got at Joppa, namely, on 29th July, two full-grown specimens were found on *Bryopsis* from rock-pools at Longniddry Bay.

H. dendritica, with its characteristic "dendritical green markings," was described by Alder and Hancock some seventy years ago, from numerous examples found in Torbay, Devon, feeding on the seaweed *Codium tomentosum*. In this account of the mollusc its length is given as three-tenths of an inch (=7½ mm.), and ova in spawn deposited on 13th May had hatched by the 22nd. The only Scottish records of *Codium tomentosum* that we can recall are from the west coast and Orkney. Though superficially *Codium* and *Bryopsis* look very different, they are in reality quite closely related, since both belong to the Siphoneæ, a small non-septate group of the green Algæ. Doubtless, therefore, they possess in common some property upon which the *Hermæa* is dependent. Hermæids, it appears, do not, strictly speaking, "eat" the substance of their food-plants, but merely scratch the surface and suck the juices thus set free.[1] Herein may lie the key to our little nudibranch's predilection, for the Siphoneæ, as the name implies, have their vegetative parts composed of long branching tubes without dividing walls, and are of a markedly "lubricous" or gelatinous nature. *Bryopsis*, it should be said, is an annual, growing up in late spring and dying off in autumn. A *Hermæa*, with dorsal processes fully extended, browsing, as it were, among the delicate green plumes of *Bryopsis*, can only be detected with some difficulty, so well does it fit in with its surroundings.[2]

The facts given above would seem to suggest that *H. dendritica* passes through two generations in the course of a year, one coming to maturity, and spawning, in May and June, the other in July and August. In what stage the

[1] Cf. *Suppl. to Alder and Hancock's Monograph*, p. 20.

[2] Since this paper was in type we see that *H. dendritica* has been found on *Bryopsis* (species not mentioned) at Plymouth. (*Journ. Mar. Biol. Ass.*, n.s., vol. vii., No. 2, Dec. 1904, p. 277.)

winter is passed is a point upon which we have no information. The absence of the food-plant (*Bryopsis*) during that season favours, however, the assumption that the autumn eggs remain unhatched till spring.

In the Handbook of the Fauna, etc., of Clyde (1901), *H. dendritica* is recorded from Cumbrae. This is the only previous Scottish record we have seen.

Lamellidoris aspera, A. & H.—Our first specimen of this small Dorid was found on the underside of a stone at low-water mark, Boglehill rocks, Longniddry Bay, 26th April 1915. In the same locality two were got on 17th May 1916, whilst on the following morning as many as eighteen, one of which spawned later in the day, were collected there. The tide on the last occasion was particularly low, thus allowing examination of numerous stones lying upon muddy ground on the seaward side of the rocks. On 27th May 1915, five specimens, some of which deposited spawn in the course of the next few days, were obtained under stones at low-water mark, Port Seton rocks; where another was found on 3rd June 1916.

While most of the specimens met with were white, several were distinctly tinged with yellow, suggestive of *Adalaria proxima;* but no structural difference was detected. Owing to its small size—length 9 or 10 mm.—*L. aspera* might readily be passed over as a young stage of one of the larger Dorids. Its presence in the Firth of Forth was quite to be expected when we consider that Alder and Hancock described it as common on the Northumberland and Durham coasts. It has also been recorded from St Andrews, the Moray Firth and the Clyde area.

As regards the other species of Nudibranchs observed, the most interesting was the minute planarian-like *Limapontia nigra*, Johnst. (?=*capitata*, Müll.), which occurred as follows:—One discovered crawling on inside of glass-tube containing small green seaweed (*Cladophora*), from rock-pool, Port Seton, 10th September 1915; several on *Bryopsis plumosa* from Joppa rocks, 25th July 1916; and two on same plant from Longniddry Bay, 29th July 1916. This species is not in Leslie and Herdman's Catalogue of Firth of Forth

Invertebrates, but it has since been recorded by Dr Thomas Scott from Newhaven, August 1887.[1]

The paucity of existing local records of even the commonest species may be cited as justification for mentioning the following further occurrences. The species are placed in the order in which they occur in Leslie and Herdman's list.

Æolidia papillosa, L.—Between Leith and Portobello, 1882; North Berwick, common, January 1896, and two 15th April 1915; rock pool, Gullane Bay, one, 21st August 1915; two under stones, Joppa, spring 1916; Longniddry Bay, a few, 17th May 1916. In the aquarium the two North Berwick specimens were observed attacking three Beadlet Anemones (*Actinia equina*, L.), from which they removed large patches of the outer pigmented layer. At North Berwick, 15th April 1915, the same sea anemone was frequently found malformed, doubtless from the same cause.

Fascelina coronata, Forb.—Port Seton rocks, two under stone, 27th May 1915; Boglehill rocks, Longniddry Bay, one on *Sertularia pumila*, 17th May 1916.

Tergipes despectus, Johnst.—One, North Berwick, September 1890.

Doto coronata, Gmel.—Boglehill Rocks, Longniddry Bay, two on *Sertularia pumila*, 17th May 1916.

Dendronotus frondosus, Ascan. (=*arborescens*, Müll.).—One in rock-pool, North Berwick, August 1897.

Polycera quadrilineata, Müll.—North Berwick, four or five in rock-pool, January 1896.

Ancula cristata, Ald.—Common in rock-pools, North Berwick, August 1897.

Goniodoris nodosa, Mont.—Boglehill rocks, Longniddry Bay, half a dozen, 26th April 1915, and four, 17th May 1916; Port Seton rocks, two, 21st April 1916; &c.

Doris tuberculata, Cuv.—North Berwick, September 1890 and January 1896; Dunbar, January 1908; Longniddry Bay, April 1915; &c.

Lamellidoris bilamellata, L.—Joppa rocks, several, one deposited spawn, 24th March 1915; Port Seton rocks, two, 21st April 1916, and one or two in July. The July examples, though adult—there was spawn on the stones beside them—were smaller than the spring examples.

[1] *7th Fishery Board Report* (1888), part iii. p. 324.

Cadlina repanda, A. and H.—North Berwick, September 1890; Boglehill rocks, Longniddry, two large and four small, 17th May, 1916.

Acanthodoris pilosa, Müll.—Dunbar, several under stones at low-water mark, January 1908; Boglehill rocks, numerous, varying from white to dark purple black, 17th May 1916.

Black-headed and Common Gulls eating Turnips.—When walking along the sea-braes near Kingsbarns on 14th February 1917, we noticed a Common Gull standing in a row of turnips, which had been shawed and were lying in rows in the field, it was pecking vigorously, apparently at one of the turnips. As we could not make certain through our glasses that it was really the turnip it was eating, one of us marked the spot while the other walked up and found the freshly hollowed-out turnip and several others in a like condition lying near. Two days later we saw several Black-headed Gulls eating turnips which were lying in a field, and on 18th February there were a lot of both species eating *growing* turnips in a field near Cambo. There had been frost for a considerable time and the ground was very hard. We were not previously aware that these birds included turnips in their dietary.—Evelyn V. Baxter and Leonora Jeffrey Rintoul, Largo, Fife.

Acanthocinus ædilis, L., and Allied Beetles on the Borders.—With reference to Mr McConachie's record (*antea*, 1916, p. 241) of the finding of an *Acanthocinus ædilis* at Lauder in July last, it may be of interest to note that this fine Long-horned Beetle occurs from time to time at Berwick, its presence there, as well as that of some allied species, being no doubt accounted for by the importation of timber from the Baltic. From time to time I used to send specimens to Dr Hardy, and some of them are mentioned in the *History of the Berwickshire Naturalists' Club*, but from my old Journals I extract the following:—On 20th August 1885, a perfect male "Timberman," *Acanthocinus ædilis*, was brought to me by one of Messrs Allan Brothers' workmen, it having been caught in the woodyard at Tweedmouth, when the man told me he had "frequently seen others sticking out of holes in Baltic pine-logs," as well as what were evidently, from his description, larvæ of the same species. On 5th September following, another specimen was captured in the street at Spittal. Several others have occurred at Berwick.

In August 1885, I got a specimen of *Monochammus sutor*, L., at Berwick, probably another importation *via* the Tweed Saw-Mills.—George Bolam.

A CHECK-LIST OF THE BRITISH TERRESTRIAL ISOPODA (WOODLICE).

By Walter E. Collinge, D.Sc., F.L.S., Carnegie Fellow, and Research Fellow of the University of St Andrews.

Comparatively little attention has been paid to the Woodlice or Terrestrial Isopoda of the British Isles. During the last few years, however, an increased interest has been evidenced which has led to the desire, on the part of many workers, for a check-list, and believing that such a list will prove useful I have undertaken the compilation of one that will show at a glance the name and authority for each species and variety, the source of the original description, and the distribution in the British Isles. In all, thirty-six species and thirty-five varieties are listed.

The capital letters following the abbreviation "Dist." after each species and variety represent:—E. = England; S. = Scotland; W. = Wales; I. = Ireland; and Ch.I. = Channel Islands.

The species are numbered consecutively and the varieties are lettered. Synonyms are without numbers or letters. Doubtful species and varieties are printed in *italics*.

ORDER ISOPODA, Latreille.

Sub-order *ONISCOIDEA*, G. O. Sars.

Section I.—LIGIINÆ.

Family **Ligiidæ**, Kinahan.

Genus Ligia, Fabr., 1798.

1. L. oceanica (Linn.). Syst. Nat., 1767, ii., p. 1061. Dist. E., S., W., I., Ch.I.
   (*a*) granulata, Leuckart. Verzeichn. Helgolands, 1847, p. 163. Dist. S., W.
   (*b*) flavescens, Collinge. Journ. Zool. Res., 1916, i., p. 122. Dist. E., S.

Genus Ligidium, Brandt, 1833.
Zia, Koch, 1841.

2. L. hypnorum (Cuvier). Journ. d'hist. nat., 1792, ii., p. 19, pl. xxvi., f. 3-5. Dist. E.

Family **Trichoniscidæ**, G. O. Sars.

Genus Trichoniscus, Brandt, 1833.
Itea, Koch, 1838.
Philougria, Kinahan, 1857.

3. T. pusillus, Brandt. Bull. Soc. Nat. Moscou, 1833, vi., p. 174. Dist. E., S., W., I.
   (*a*) violaceus, Schöbl. Ziva, 1861, p. 310. Dist. E., S.
   (*b*) *intermedius*, Bagnall. Trans. N. H. Soc. Northumb., 1909, iii. p. 44.
4. T. pygmæus, G. O. Sars. Crust. Norw., 1898, ii., p. 162, pl. lxxii., f. 2. Dist. E., W., S., I.
5. T. spinosus, Patience. Ann. Scot. Nat. Hist., 1907, p. 85, pl. iii. Dist. S.
6. T. stebbingi, Patience. Journ. Linn. Soc. (Zool.), 1907, xxx., p. 42, pl. vii. Dist. E., S., I.
7. T. vividus (Koch). Deutsch. Crust., etc., 1840. Dist. E., I.
8. T. roseus (Koch). Ibid. Dist. E., S., W., I., Ch.I.
   (*a*) flavus, Collinge. Journ. Zool. Res., 1916, i., p. 122. Dist. E.
9. T. linearis, Patience. Ann. Mag. Nat. Hist., 1908, i., p. 280, pl. xi. Dist. E.[1]

Genus Trichoniscoides, G. O. Sars, 1898.

10. T. albidus (Budde-Lund), (non *T. albidus*, G. O. Sars = *T. sarsi*, Patience). Pros. Crust. Isop. Terr., 1879, p. 9. Dist. E., S., I.
11. T. sarsi, Patience. Ann. Mag. Nat. Hist., 1908, ii., p. 85, pl. vi. Dist. E., S.
12. T. scabrous, Collinge. Journ. Zool. Res., 1917, ii., p. 95. Dist. E.

Genus Haplophthalmus, Schöbl, 1850.

13. H. mengii (Zaddach). Synops. Crust. Pruss. Prod., 1844, p. 16. Dist. E., W., S., I.

[1] So far has only been obtained from Kew Gardens.

14. H. DANICUS, Budde-Lund. Nat. Tidssk., 1870, vii., p. 228. Dist. E., S., I.

Section II.—ONISCINÆ.

Family **Oniscidæ**, Latreille.

Genus ONISCUS, Linn., 1746.

15. O. ASELLUS, Linn.[1] Fauna Suecica, 1746, p. 500. Dist. E., S., W., I., Ch.I.
   (*a*) ALBIDUS, Collinge. Journ. Zool. Res., 1916, i., p. 122. Dist. S.
   (*b*) BICOLOR, Collinge. Lanc. and Ches. Nat., 1917, p. 266. Dist. E.

Genus PHILOSCIA, Latr., 1804.

16. P. MUSCORUM (Scopoli). Entomol. Carnio., 1763, p. 415. Dist. E., S., W., I., Ch.I.
   (*a*) OBSCURA, Scopoli. Ibid., p. 415. Dist. E.
   (*b*) FLAVA, Bagnall. Trans. Derwent Nat. Hist. Soc., 1913, p. 12. Dist. E.
   (*c*) ROSEA, Bagnall. Ibid., p. 12. Dist. E.
   (*d*) NACRUM, Collinge. Journ. Zool. Res., 1916, i., p. 122. Dist. E.
   (*e*) VIOLACEUM, Collinge. Ibid., p. 122. Dist. E., Ch.I.
   (*f*) STANDENI, Collinge. Lanc. and Ches. Nat., 1917, p. 266. Dist. E., W.
17. P. COUCHII, Kinahan. Nat. Hist. Rev., 1857, iv., p. 195, pl. xxiii., f. 4. Dist. E, S., I.
18. P. PATIENCEI, Bagnall. Ann. Mag. Nat. Hist., 1908, i., p. 428, pl. xviii. Dist. E.

Genus CYLISTICUS, Schnitzler, 1853.

19. C. CONVEXUS (De Geer). Mem. a l'hist. Insectes, 1778, vii., p. 553, pl. xxxv., f. 11. Dist. E., S., I.
   (*a*) PATIENCEI, Collinge. Journ. Zool. Res., 1916, i., p. 123. Dist. S.

Genus PORCELLIO, Latr., 1804.

20. P. SCABER, Latr. Hist. Nat. Crust., 1804, p. 45. Dist. E., S., W., I., Ch.I.

[1] Many authors have adopted Cuvier's name of *murarius* for this species. The *O. fossor*, Koch, is an immature example of *O. asellus*.

(*a*) MARMORATA, Brandt. Medizin. Zool., 1833, ii., p. 78. Dist. E., S., W., I., Ch.I.

(*b*) MARGINATA, Brandt. Ibid., p. 78. Dist. E., S.

(*c*) UNICOLOR, Brandt. Ibid., p. 78. Dist. E., S.

(*d*) RUFA, Scott. Proc. Roy. Phys. Soc., 1893, p. 78. Dist. S.

(*e*) RUFESCENS, Collinge. Journ. Zool. Res., 1916, i., p. 122. Dist. E., S., W., I.

(*f*) DARWINIANA, Bagnall. Trans. N. H. Soc. Northumb., 1909, iii., p. 47. Dist. E.

(*g*) AUBINI, Collinge. Ann. Mag. Nat. Hist., 1914, xiii., p. 71. Dist. Ch.I.

(*h*) LATERITIUS, Collinge (= RUFA, Bagnall). Journ. Zool. Res., 1916, i., p. 123. Dist. E.

(*i*) ALBIDA, Rhodes. Naturalist, 1916, p. 122. Dist. E.

21. P. PICTUS, Brandt. Medizin. Zool., 1833, ii., p. 78, pl. xii., f. 5. Dist. E., S., W., I., Ch.I.

(*a*) TESSELLATUS, Brandt. Ibid., p. 79. Dist. E., S., Ch.I.

(*b*) FLAVO-MACULATUS, Brandt. Ibid., p. 79. Dist. E., S., Ch.I.

(*c*) MARMORATUS, Brandt. Ibid., p. 79. Dist. E.

(*d*) FLAVO-TESSELLATUS, Lereb. Mém. Soc. Mus. d'Hist. Nat. Strasb., 1853, iv., p. 52, pl. i., f. 9. Dist. E., S.

(*e*) FUSCO-MACULATUS, Lereb. Ibid., p. 53, pl. i., f. 11. Dist. E., S.

(*f*) AUREOMACULATUS, Collinge. Journ. Zool. Res., 1916 i., p. 123. Dist. E., S., W.

22. P. DILATATUS, Brandt. Medizin. Zool., 1833, ii., p. 78, pl. xii., f. 6. Dist. E., S., I., Ch.I.

(*a*) FLAVUS, Collinge. Lanc. and Ches. Nat., 1917, p. 266. Dist. E.

23. P. RATHKII, Brandt. Bull. Soc. Nat. Moscou, 1833, vi., p. 177. Dist. E.

(*a*) STRIATUS, Schnitzler. Onis. Bonnensis, 1853, p. 24. Dist. E.

24. P. RATZEBURGII, Brandt. Ibid., p. 175. Dist. E., Ch.I.

25. P. LÆVIS, Latreille. Hist. Nat. Crust., 1804, vii., p. 46. Dist. E., I., Ch.I.

Genus PORCELLIONIDES, Miers, 1876.
METOPONORTHUS, Budde-Lund, 1879.

26. P. PRUINOSUS (Brandt). Bull. Soc. Nat. Moscou, 1833, vi., p. 181. Dist. E., S., W., I., Ch.I.

27. P. CINGENDUS (Kinahan). Nat. Hist. Rev., 1857, iv., p. 279, pl. xix., f. 1. Dist. E., I.
28. P. MELANURUS (Budde-Lund). Crust. Isop. Terr., 1855, p. 181. Dist. I.

Genus PLATYARTHRUS, Brandt, 1833.
TYPHLONISCUS, Schöbl, 1860.

29. P. HOFFMANNSEGGII, Brandt. Bull. Soc. Nat. Moscou, 1833, vi., p. 174, pl. iv., f. 10. Dist. E., S., W., I.

Family **Armadillidiidæ**, Brandt.

Genus ARMADILLIDIUM, Brandt, 1833.

30. A. VULGARE (Latr.). Hist. Nat. Crust., 1804, vii., p. 48. Dist. E., S., W., I., Ch.I.
    (*a*) PLUMBEUS, Lereb. Mém. Soc. Mus. d'Hist. Nat. Strasb., 1853, iv., p. 73. Dist. E., Ch.I.
    (*b*) VARIEGATUS, Lereb. Ibid., p. 73. Dist. E.
    (*c*) BRUNNEOFLAVESCENS, Collinge. Journ. Zool. Res., 1916, i., p. 124. District E.
31. A. DEPRESSUM, Brandt. Medizin. Zool., 1833, ii., p. 82, pl. xiii., f. 4-6, C and D. Dist. E., Ch.I.
    (*a*) MACULATUM, n. var. Ground colour yellow with middle portions of mesosomatic segments mottled with brownish-coloured patches on the anterior half, posterior half and pleural plates yellow, also whole of metasome. Dist. E.
32. A. PULCHELLUM, Brandt. Ibid., p. 188. Dist. E., I.
33. A. ALBUM, Dollfus. Bull. Soc. d'Études Sci. Paris, 1887, p. 4. Dist. E.
34. A. NASATUM, Budde-Lund. Crust. Isop. Terr., 1885, p. 51. Dist. E., I.
35. A. PICTUM, Brandt. Bull. Soc. Nat. Moscou, 1833, vi., p. 186. Dist. E.

Genus ELUMA, Budde-Lund.

36. E. CÆLATUM (Miers).
    PURPURASCENS, Budde-Lund. Proc. Zool. Soc. Lond., 1877, p. 665, pl. lxvii., f. 3. Dist. I.

Distribution.

Species.	England.	Wales.	Channel Islands.	Isle of Man.	Isle of Wight.	Scotland.	Ebudes.	Outer Hebrides.	Orkney & Shetland.	Ireland.
1. Ligia oceanica	×	×	×	×	×	×	×	...	×	×
2. Ligidium hypnorum	×	...	...	...	...	...	...	...	...	...
3. Trichoniscus pusillus	×	×	...	...	...	×	...	×	...	×
4. ,, pygmæus	×	×	...	...	...	×	...	...	...	×
5. ,, spinosus	...	...	...	...	...	×	...	...	...	...
6. ,, stebbingi	×	...	...	...	×	×	...	...	...	×
7. ,, vividus	×	...	...	...	...	...	...	...	...	×
8. ,, roseus	×	×	×	...	×	×	...	...	...	×
9. ,, linearis	×	...	...	...	...	...	...	...	...	...
10. Trichoniscoides albidus	×	...	...	...	...	×	...	...	...	×
11. ,, sarsi	×	...	...	...	...	×	...	...	...	...
12. ,, scabrous	×	...	...	...	...	...	...	...	...	...
13. Haplophthalmus mengii	×	×	...	...	...	×	...	...	...	×
14. ,, danicus	×	...	...	...	...	×	...	...	...	×
15. Oniscus asellus	×	×	×	×	×	×	×	...	×	×
16. Philoscia muscorum	×	×	×	...	×	×	...	...	×	×
17. ,, couchii	×	...	...	...	×	×	...	...	...	×
18. ,, patiencei	×	...	...	...	..	...	...	...	...	...
19. Cylisticus convexus	×	...	...	...	...	×	...	...	...	×
20. Porcellio scaber	×	×	×	×	×	×	...	×	×	×
21. ,, pictus	×	×	×	×	×	×	...	...	...	×
22. ,, dilatatus	×	...	×	...	×	×	...	...	...	×
23. ,, rathkii	×	...	...	...	×	...	...	...	...	...
24. ,, ratzeburgii	×	...	×	...	...	...	...	...	...	...
25. ,, lævis	×	...	×	...	...	...	...	...	...	×
26. Porcellionides pruinosus	×	×	×	...	×	×	...	...	...	×
27. ,, cingendus	×	...	...	...	×	...	...	...	...	×
28. ,, melanurus	...	...	...	...	...	...	...	...	...	×
29. Platyarthrus hoffmannseggii	×	×	...	...	...	×	...	...	...	×
30. Armadillidium vulgare	×	×	×	...	×	×	...	...	...	×
31. ,, depressum	×	...	×	...	×	...	...	...	...	...
32. ,, pulchellum	×	...	...	...	...	...	...	...	...	×
33. ,, album	×	...	...	...	...	...	...	...	...	...
34. ,, nasatum	×	...	...	...	...	...	...	...	...	×
35. ,, pictum	×	...	...	...	...	...	...	...	...	...
36. Eluma cælatum	...	...	...	...	...	...	...	...	...	×

Healed Fracture in Tarsus of Golden Plover.—A Golden Plover (*Charadrius apricarius*) shot on the shore at Cambo, Fife, on 15th February 1917, and forwarded to me, shows an interesting example of the mending of a broken bone. The left tarsus in its lower third is the seat of a healed fracture. Its direction is obliquely upwards and to the left, and the union is bony throughout. The lower fragment, which has probably been comminuted, is displaced upwards and outwards, with a slight degree of rotation forwards, while the upper fragment is slightly convex anteriorly. There is shortening to the extent of 6 mm. Both fragments throughout are much swollen and rarified, as a result of inflammation. The tibio-tarsal articulation appears normal. There is moderate thickening of the bones at the first interdigital articulation of the third toe of the maimed foot, this would, I think, correspond to the portion of it which would come in contact with the ground. The toes are drawn up and fixed; this is due to firm, fibrous adhesion of the flexor tendons at the seat of fracture. The right foot has developed a large pad. This is formed of fibrous and adipose tissue, there being no indication of inflammation or suppuration.—L. R. Sutherland, Dundee.

Red-necked Grebe in the Moray Area.—On the morning of 9th October 1912 there were several Red-necked Grebes in Udale Bay, Cromarty Firth. I saw perhaps half a dozen in all, fishing, singly, close in-shore. Apart from the diagnostic characters mentioned by Miss Jackson (*antea*, p. 69), which are only available in a good light and at close quarters, the Red-necked Grebe in winter dress appears not only to be rather smaller but more stoutly built than the Great Crested, and the dorsal surface is darker. The neck in the larger bird seems to be relatively as well as actually longer and more slender, and the body tapers more.—Charles Oldham, Berkhamsted, Herts.

Moorhens perching on Trees.—My friend Mr W. L. Walker writes me as follows:—"My dog flushed three Moorhens out of the meadow at Auchinbothie (Kilmacolm). All the birds flew high into the wood and lighted on the tops of the birch-trees—at least 25 or 30 feet high. They sat there while I was in the vicinity for over half an hour." When the writer was living on Caldwell estate, the old keeper (Mr Proctor) showed him a Rook's nest in the "Crow Wood" in which a Moorhen hatched out her brood in two successive seasons. This nest would also be about 30 feet from the ground in a Scots fir-tree.—T. Thornton Mackeith.

Flies in House at Whittingehame.—I have observed flies coming into Whittingehame House every autumn for many years past. Nearly all those about the size of a house fly (but I have never identified the species) come in on the sunny days of September when the nights begin to get cold. The length of the house stands (roughly speaking) N.W. to S.E., and it is at the S.E. end of the S.W. side that the flies chiefly come in, and much more on the two upper storeys than on the ground floor. I attribute this to their following the sunlight to the last possible moment. There is at the W. and N.W. end of the house a group of large trees, and as the sun goes down, the shadow of these trees gradually rises over the house, so that the last place where there is still sunlight is, as I mentioned, where the flies mostly go in. That they come in by day is proved by the fact that if the windows are kept shut all day and only opened after sunset, comparatively few flies come in. Large numbers of a very small fly also come in, but my belief is that they come in chiefly at night. The windows of my room (which are the ones at the end of the house where the large flies come in) are open all night, and on suitable nights I notice a large number of flies on, or near, the windows in the morning, of which there were no signs the day before. These small flies come very much to any light place in the window. They also come in chiefly in September. At the time of year when the flies come into the house a quantity of Keating's insect powder is dusted over the window ledges and the frames of the panes every day, which kills or stupifies the flies on the windows, and those thus disabled are destroyed. This gives a clear indication, therefore, that numbers of them come in day after day.—Alice Balfour, Whittingehame.

In October last Miss Balfour kindly sent a large number of flies found on the windows of her house during the third week of that month. I have worked carefully through the collections, with the following result: of *Limnophora sexnotata*, Ztt., there are several hundreds of females, but apparently no males; *Pollenia rudis*, Fab., about 189 males and 379 females; *Pyrellia eriophthalma*, Mcq., over 200 males and about 300 females; with a few odd specimens of *Sarcophaga carnaria*, L. (4 females), small undetermined Anthomyiidæ (4 females), *Muscina stabulans*, Fln. (1 female), *Leptis tringaria*, L. (1 male), and *Melanostoma mellinum*, L. (1 female).—Percy H. Grimshaw.

Ligia oceanica (L.) in Stirlingshire and at Skerryvore.—On 23rd November 1912, while looking for spiders and beetles under stones lying among the grass on top of the shore embankment immediately to the east of Grangemouth, Stirlingshire, I was somewhat surprised to find scores of this "slater." They were mostly young, not more than half grown apparently; and none reached the size of examples I have collected at the mouth of the Forth (North Berwick, Isle of May, etc.). The spot where they were found is well above high-water mark, though no doubt it gets drenched with spray during severe storms from the north and east. Still further up the estuary, about half-way between Grangemouth and Kincardine ferry, the species was again found on 1st March 1913. The point of interest about these records is the distance of the localities from the open sea. As a contrast in this respect, I may mention that in August 1915 I received from the late Mr R. Wilson, lighthouse keeper, Skerryvore, a bottleful of very large specimens from that outlying Hebridean rock.—William Evans, Edinburgh.

The Effect of Kelp-cutting on Shore Animals.—More than once the suggestion has been made that the destruction of the beds of seaweed on the coasts of America, for manufacture into kelp, had a deleterious effect on the shallow-water animals in the neighbourhood. The United States Bureau of Fisheries has put this allegation to the test, careful examination having been made of seaweeds, collected for kelp, before they were burned. It was found that they harboured many species of lower animals, but no evidence of the presence of fish themselves, of their eggs, or of crayfish larvæ was found. In the actual kelp beds down to a depth of 8 or 10 feet a few small fishes were taken, but they were not of edible kinds, and the growth of the seaweed is so rapid that the work of three harvesters for three months did not affect appreciably the amount at the surface of the water. There is little likelihood, therefore, that the kelp industry affects to any extent the value of the kelp-beds as nurseries for marine animals in their young stages.

Pupa cylindracea, var. curta, in Wigtownshire.—The examples recorded in my list (*Scot. Nat.*, Nov. 1915, pp. 273-4) as taken by Mr Alex. Ross in roadside plantation between the Isle of Whithorn and Port William, 1st August 1916, are of this variety; Mr Taylor noted them as $2\frac{1}{2} \times 1\frac{1}{2}$ mm., with 5 whorls and rufous lip. I shall be pleased to see further records of mollusca for this county. —W. Denison Roebuck, Leeds.

Wigtownshire Mollusca.—Since my paper was printed I have received a few additional notes, and shall always be pleased to have more. Mr J. F. Musham found *Cochlicopa lubrica* numerous about Stranraer, 15th August 1909, and *Carychium minimum* in Dunskey Wood, 18th August 1909. He found *Pupa cylindracea* numerous on dry stone walls at Dunskey Wood, and *Clausilia bidentata* much the commonest shell in the district about the Battery at Portpatrick. The Battery Portpatrick record for *Vitrina pellucida* is his, and he found *Arion subfuscus* numerous about Stranraer. The Dunskey Wood record for *Ancylus fluviatilis* is an error of transcription: it was numerous in a burn by the roadside about a mile out of Portpatrick on the road to Stranraer, close to the "London" milestone. I hope other naturalists will add to these and my other lists.—W. Denison Roebuck, Leeds.

BOOK NOTICE.

Nature Study Lessons Seasonally Arranged. By J. B Philip, M.A., Cambridge: University Press—Nature Study Series, 147 pages and 23 figures. Price 2s. 6d. net.

Although not indicated in the title, this little volume is exclusively devoted to the science of botany, consisting of a series of twelve chapters, equally divided between the four seasons of the year, and intended to introduce the young pupil to the study of the morphology and physiology of some common types of plant life. In the preface the hope is expressed that the book may be found suitable for pupils of eleven to fourteen years of age, but we venture to think that the work is somewhat advanced for such a purpose. In the hands of a sympathetic teacher, however, the various lessons may be rendered sufficiently interesting to the boy or girl of average intelligence if care be taken not to attempt too much at a time. The subjects are well selected and the text clear and suggestive—admirably suited, indeed, for the *pupil-teacher* of somewhat maturer years. Personally we feel that the treatment of natural history as part of the school curriculum for *children* should be as little *forced* as possible, otherwise any inborn taste for the subject is liable to be strangled by the feeling of compulsion which is so often associated with school-lessons. Given a natural liking for the science, and the aid of a thoroughly suitable teacher, such a volume as that now before us should prove of much value to the young pupil, enabling him to form a correct notion of the structure and functions of the various parts, vegetative and reproductive, of the subjects chosen for study.

(*Authors are responsible for nomenclature used.*)

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A CHAIR OF ECONOMIC ORNITHOLOGY.

By William Berry, B.A., LL.B., M.B.O.U.

The following observations are submitted to the readers of the *Scottish Naturalist* with the object of supporting, however slightly, the proposals made by Dr Walter E. Collinge, in the article from his hand which is reprinted in the March issue from the *Journal of the Royal Horticultural Society*. The thanks of all who are interested in this most important subject are due to Dr Collinge for his painstaking investigations, and to the editors for giving Scottish ornithologists an opportunity of acquainting themselves with his conclusions.

Dr Collinge rightly points out that the preservation of wild birds must be undertaken in no spirit of indiscriminating philanthropy, or philorny, if the word may be permitted; but that the decision whether any particular bird should be afforded a measure of protection, or, on the other hand, should be outlawed, and slain at sight by every patriotic citizen, ought only to be come to as the result of patient and laborious investigation of its feeding habits, by competent and unprejudiced observers.

Hitherto such researches can hardly be said to have been made by observers who had not any special theorem which they desired to establish. Take the case of the Woodpigeon,

in defence of whom who would care to say a word? Yet black as his conduct is, even the Woodpigeon is still not quite as black as he is painted.

In the year 1894 to 1895, Sir John Gilmour of Montrave, an ornithologist, and an agriculturist on a very large scale as well, undertook his very careful enquiry into the relation of certain birds to the agricultural interest as shown by their diet, the results of which were published in the *Transactions of the Highland and Agricultural Society for Scotland* in 1896. On p. 11 of the reprint of this paper, which is no doubt in the hands of all those who are interested in this very important question, there is a detailed calendar of pigeon food, which is itself the basis of the schedule of Total Injuries and Benefits, on p. 7 of the reprint. The indictment is as follows :—

Part of Plant used.	Crops.	Trees.	Weeds.
	Number of times taken.	Number of times taken.	Number of times taken.
Roots	29	0	2
Leaves	79	1	23
Flowers	0	13	16
Cereal Grains . .	123	0	0
Other fruits and seeds .	23	33	32

—and here is the verdict. "There is no uncertainty, no dubiety about the meaning here; the figures as given by himself condemn, and we cannot but convict. The root crops stand entirely against him; amongst the leaves, the clovers accuse him most strongly; and in the case of cereal grains, no extenuation whatever for his outrage is offered. Though grain be left entirely out of court, the pigeon stands utterly condemned by the heavy black score standing against him for root-crop and clover-leaf destruction."

Now the first point that strikes a peruser is that *all* crop material is grouped together as stolen from the food supply of the country; but a great deal of this material was certainly valueless waste, so far as the country or the farmer is concerned. In 1894, the harvest was moderately early.

From my notes, I find that the first fields of corn were cut from the 24th to the 29th of August, and that with the exception of a single belated, late-sown field, the whole grain crops were cut and in stack, and the stubbles raked, by the early days of October. My district is in the same county as Sir John Gilmour's, and the agricultural calendar of the two places may be taken to be as nearly as possible identical.

Even in the sowing months, much of the grain picked up is not in diminution of the country's food supply. Pigeons do not scratch as domestic fowls do, and most of the grain they pick up is grain left uncovered on the surface of the ground, which would not in any case go to swell the harvest yield. This too might to a considerable extent be classed as waste material, but as undoubtedly some of this diet involves a loss to the country, for some of the grains were sprouted, for the purpose of this analysis let it all go in the category of "injuries."

In hard weather, rotten potatoes and turnip tops are the staple food. These are much in evidence in the crop-contents examined during the months of December 1894, and of January and February 1895, and this is as one would expect; for towards the end of the year, there began a "storm" of unusual severity, the temperature being almost continuously below the freezing point until well on in March. At this season turnip tops are practically waste material, for their function is at an end; and rotten potatoes, or potatoes of any kind left lying on the bare fields, are wholly so.

Applying these principles then, a different analysis of the schedule on p. 11 of the reprint would produce the following results (see Table, pp. 124-125).

In the 374 diets therefore, Sir John Gilmour's classification is—

Weeds (good)	73
Trees (neutral)	47
Crops (bad)	254
	374

Food Items.	1894. March.	1894. April.	1894. May.	1894. June.	1894. July.	1894. August.
Roots.						
Good . .	...	...	...	Pilewort . 2	...	...
Neutral .	Potato . 1	...	...	...	...	...
Bad . .	Turnips and Swedes. 4	...	...	...	...	...
Leaf.						
Good . .	Buttercup 1	...	...	Charlock . 1	Charlock 7	Charlock 3
Neutral .	Turnips and Swedes. 9	Turnips and Swedes. 1	Oak . 1	...	...	...
Bad . .	Clovers. 11	...	Clovers. 3	Clovers . 9	Turnips 8 Clovers 9	Cruciferæ 3 Clovers. 1
Flower.						
Good . .	...	...	Charlock 1	Buttercups. 4 Charlock . 1 Annual Grass 1	Charlock 6 Buttercups 2	Charlock 1
Neutral .	Elm . 2	...	Beech . 11	...	...	...
Bad . .	...	...	...	...	...	...
Cereal Grains.						
Good . .	...	...	...	...	...	...
Neutral .	...	...	...	...	...	...
Bad . .	Barley . 4 Wheat . 1 Oats . 1	Barley . 18 Oats . 3	Barley . 3 Oats . 3	Oats . . 1	...	Barley 11 Wheat . 1 Oats . 10
Other Fruit Seed.						
Good . .	Docks . 4	...	Speedwell 3 Goose Grass 1	Cruciferæ . 3 Chickweed . 1	Spurrey 8 Cruciferæ 1 Chickweed 1	Spurrey 3 Speedwell 1 Chickweed 1
Neutral .	...	...	Elm . 1	Elm . . 15	Elm . 2	...
Bad . .	Beans . 1	Beans . 5 Tares . 1	Grass Mixture 3	Beans . 1	Ryegrass 1	...

1894. September.	1894. October.	1894. November.	1894. December.	1895. January.	1895. February.	Good.	Neutral.	Bad.
...	...	...	...	...	...	2	...	...
...	...	...	Potato . 7	Potato . 7	Potato 8	...	23	...
...	...	...	...	...	Swede 2	...	...	6
...	...	...	...	...	...	12	...	...
...	...	...	Turnip and Swede . 2	Turnip and Swede 18	Swede 8	...	39	...
Clover . 4	...	...	Clover . 1	Clover . 1	Clover 2	...	...	52
...	...	...	...	...	...	16	...	...
...	...	...	...	...	...	...	13	...
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...
...	Barley . 19 Wheat . 5 Oats . 2	Barley . 10 Wheat . 1	Barley . 6 Oats . 3	...	Barley 1	...	47	...
Barley . 9 Wheat . 4 Oats . 6 Rye . 1	...	...	...	...	...	...	...	76
Cruciferæ 3 Dock . 2	...	...	...	...	...	32	...	...
Beans . 4 Beechnuts 3 Peas and Tares . 1	Beechnuts 6 Beans . 3 Geans . 2 Tares . 1 Haws . 1 Maize . 1	Beechnuts 2 Beans . 1	Beechnuts 1	...	...	...	44	...
...	...	...	...	...	...	...	...	12
						62	166	146

but another classification would rather show—

Good	62
Neutral	166
Bad	146
	374

No doubt the "injury" does outweigh both the good and the utilisation of waste material as well; although the Pigeon is in itself a good food product, if considerably less valuable than the grain it consumes. But my argument is not that Woodpigeons should be preserved, but that even in the case of an admittedly harmful bird, statistics may be so used as gravely to overstate the case against it; and that in the case of birds whose records are supposed to be bad, but which do more good than is sometimes attributed to them, similar methods may produce a wrong impression altogether.

Another point that must be kept in view in considering whether any particular bird should be afforded, or denied, protection, particularly in the breeding season, is the matter of its migration habits. This is a difficult question to unravel, but it is at all events clear that it is the individual bird whose services or misdeeds have to be weighed, one against the other, and not necessarily the dietaries of the different birds, or groups of birds, composing the species. If the Blackbird or Song-thrush that is with us during the breeding season, destroying numberless slugs and snails and noxious insects, leaves us before the autumn fruit ripens, it would be a mistaken policy to destroy that bird in the supposed interests of the apple or pear crop, however much injury may be done to these fruits by immigrant birds of the same species, bred in North-Western Europe. Dr Eagle Clarke has shown (*Studies in Bird Migration*, Vol. I., p. 213) that a general southward migration, of the British Song-thrush at all events, commences as early as the beginning of August, or even in some seasons in July, and the Blackbird is seen at the lighthouses by September. Probably many remain till later in the year, and many individuals reside permanently in their native districts, but so far as my observation goes,

that is not the case here. Song-thrushes are very numerous here in spring and summer, exceedingly so in autumn at the season of the passage migration, and almost wholly absent in winter. Our British Blackbirds are not perhaps migratory to the same extent as the Song-thrush, and it is possible they may not leave us at all. A few years ago one with a white head was with us for three consecutive winters (it was killed by a cat and brought into a house in the third winter), but it always disappeared before the breeding season. From this I am inclined to believe that the Song-thrush or Blackbird who takes a small toll of the strawberries or gooseberries in July is the individual who has been an industrious gardener all summer, but that almost before even the small-fruit season is over, many of the Blackbirds and all the Song-thrushes have gone from us to be seen no more for good or ill till February comes round; and that the birds seen in autumn—and for the most part in the open fields—are the migrating flocks making their way south from areas far to our north.

If I am right in this, the indiscriminate slaughter of Blackbirds and Song-thrushes in the nesting season, under the belief that the fruit crops will thereby be conserved, may do more harm than good to these very crops, and this, even although fruit may form the bulk of the crop-contents of selected individuals, killed for examination in the fruit season. The fruit diet is noticed at once, but the unostentatious consumption of countless hosts of grubs and insects, especially in the early mornings, is much less readily observed.

In these days the correspondence columns of the daily papers are filled with letters advocating the general destruction of birds that are supposed to be injurious, and already Pheasants have been recommended for persecution during their nesting season, Gulls of all kinds are excepted from the operation of the Wild Birds' Protection Acts, and Sparrow Clubs have received the special benison of the Board of Agriculture and Fisheries.

As regards sea birds, I have little first-hand information. The diet of these birds has however been under the careful investigation of the Suffolk and Essex Fishery Board which

has published interesting reports. At the request of the Board I sent in the year 1913, twenty-two nestlings of the Black-headed Gull, caught and chloroformed at a gullery on Tentsmuir, to their secretary, Dr Francis Ward. The sentence of the Report which deals with these birds may be allowed to speak for itself. "Twenty-two nestlings of the Black-headed Gull were examined. These were obtained from a gullery 150 to 300 yards from high-water mark, and $1\frac{1}{4}$ miles from several small artificial lochs stocked with trout. An analysis of the food contained shows that the material destroyed was distinctly in favour of the agriculturist. There were present, remains of 2 small fish, 33 useful beetles, and 6 earthworms. On the other hand, 51 harmful beetles and insects, and 31 wireworms were destroyed." At the ensuing general meeting of the Board it was decided to continue the investigation, and to devote particular attention to the land feeding habits of the gulls in the district, in order to investigate whether the harm done to fish and fish food was counterbalanced by the benefits derived by the agriculturist.

The Sparrow is a bird which is undoubtedly very much too abundant. It is prolific, often rearing three broods in a season, it is adaptive, and it has few enemies; while being practically omnivorous, it is never at a loss for food. Yet even the destruction of the Sparrow should be undertaken with caution; for the very fact that the Board of Agriculture have thought it necessary to remind those about to embark on this crusade that the bird concerned is the "House Sparrow," points out the dangers with which their action is attended. Members of Sparrow Clubs are as likely as not neither to know, nor to wish to know, the difference between the habits of Sparrows and those of other small birds. Moreover, the Sparrow is particularly well able to take care of himself. During a long convalescence after a serious illness, I once possessed myself of a collecting gun, with the intention of waging a war against the Sparrows whose nests were much in evidence around my chair. The principal result was that I learned the wariness of the Sparrow when danger threatens. The bag of a Sparrow Club is not unlikely to number the

bulk of its elements from species which on every ground merit protection and not death.

Moreover, the policy of enlisting school children in a general campaign of nest destruction is one at which every sentiment of humanity revolts in horror. For years, the Royal Society for the Protection of Birds, and numberless individual sympathisers with its aims, have striven to show the children of our country the delights of nest protection, and the futility, to use no stronger term, of tearing down every nest the minute it is descried. The success in my own district has been marked and gratifying. But if boys are now to be encouraged and actually paid to destroy eggs and young of "Sparrows," or what are to pass as such, all this work will be undone in a day. Whatever the private knowledge of the boys may be, what local dispenser of blood money is likely to be a man capable of telling the unfeathered young of a Sparrow from that of any other species of Finch? It would almost seem that the whole scheme is one for the calculated promotion of cruelty by children, in combination with the encouragement of fraud. "*Fas est et ab hoste doceri*," it is true; are we therefore to take lessons also in "frightfulness" from our foes?

But even Sparrows are not as black as they are painted. Dr Collinge has shown from the systematic examination of nearly 300 Sparrows, the majority of which were killed in a fruit-growing district, that the great bulk of the food carried to the nestling young consists of weevils, and the larvæ and grubs of noxious insects, which if not destroyed would at least do incalculable harm to fruit and land crops (*Journal of the Board of Agriculture*, vol. xxi., October 1914). It is the writer's opinion that a great reduction in the number of Sparrows would be wholly beneficial, for the good done by the present excess of Sparrows, great as it is, might be competently accomplished by other birds in every way more meritorious; but the danger is that it is just these very birds which will be the chief sufferers at the hands of the Sparrow Clubs, while the Sparrows themselves in great measure escape.

The Pheasant has long been known—to those who are

wholly ignorant of its habits and dietary—to be an unmixed evil. It is supposed that in some way Pheasants succeed in providing themselves with a food supply of grain for twelve months in the year; and I have even read an address by a member of a learned Society to an audience of youthful politicians, in which it was calculated that one Pheasant consumes the equivalent of "five quartern loaves" in grain in a day, which even at pre-War prices would show a Pheasant to cost three times as much to keep for a year as a fat ox.

In all this there is nothing new. Mankind is always prone to jump to a conclusion, without taking the trouble to secure evidence on the point at issue, or to weigh it if it is tendered. In a pamphlet on the ethics of Game Preservation by the late Mr John Burn Murdoch of Gartincaber, published in 1847, the following extract from a recent East Lothian election address is quoted. "That the owner of land should let his farm to a tenant for the business of husbandry, and reserve the right to breed wild animals and feed them on the tenant's crops, is an act so monstrous, that nothing but habit and custom could blind any rational person to its injustice." And if, and so far as, the premises of this candidate for Parliamentary honours are sound—had he even confined his argument to the depredations of hares and rabbits—I think his conclusions would receive very general assent. But as to whether his premises were or were not sound, I do not suppose he ever paused to enquire. And in truth his position is not less assailable than that of the gamekeeper who kills down Owls and Kestrels because he sees them in the vicinity of his rearing field, or the agriculturist who seeks to benefit his crops by destroying the first bird, and by preference all the birds, he finds in proximity to his fields or garden.

To show that the usefulness of the Pheasant was not unknown even in 1847, from the same pamphlet the following passage may be quoted. "In the earlier months of winter (November and December) a few weak pickles of grain will still be found in the Pheasant's crop, but the great proportion of its contents consists of leaves and shoots of wild grasses,

insects, grubs, and larvæ of insects. Later in the season, insects and roots of weeds, with bits of decayed vegetable matter, such as rotten potatoes and turnip tops, are their chief support, and as the spring advances, the roots of weeds beginning then to acquire a certain succulency of consistence, constitute almost their only food. To enable them, however, to find this kind of food in quantity, there must be arable or ploughed ground within their reach, where the roots of the weeds are exposed. In general, upon opening a Pheasant's crop, a mixture of food such as has been mentioned will be found, although on some occasions it is filled entirely with one substance. For instance, the crop of an individual killed upon 1st February, in marshy ground on the edge of a small sheet of water, was found filled exclusively with wireworms: it contained upwards of two hundred of these vermin. In the end of the same month, or the beginning of March, having observed several Pheasants feeding very busily on a ploughed field, I had one killed as he went to roost. His crop was very full, and was found exclusively stuffed with weed roots. These roots were soft, quite full of sap, and had been broken into pieces of about three-fourths of an inch in length. In both these instances, the birds had thriven amazingly well on such diet; they were particularly fat and plump, and in high condition."

Pheasants are not "wild animals," but they are wild birds, and they do not readily submit to domestication. If grain is lavishly strewn in the poultry yard, the domesticated poultry will gorge themselves, and will then sit about and wait for a recurrence of the bounty. But Pheasants prefer to search for their food, and even if an unstinted supply is offered to them in their coverts, will wander far from home, picking as they go. Every gamekeeper knows that the way to check this idiosyncrasy is to meet it by scattering the "feed" among dead leaves, or beneath straw, or in some way hiding it so that it must be sought for. A certain amount of grain food is, of course, always acceptable, but unless the birds are in very excessive numbers, and are not being artificially and skilfully fed—a combination of

circumstances that is not likely to be met with—the amount of harvestable grain which Pheasants consume is exceedingly small. Even in the fields of ripening corn, the grain is for the most part beyond their reach, while at that season the supplies of their natural, insect food are practically inexhaustible. For a short time after the corn is cut, and before the fields are cleared, some grain will be theirs that would otherwise be raked up and carried to the corn-loft; but much of it is second quality grain, and weather-blemished, at best, and of very little consequence to the farmer or the nation. In the sowing months, some grain again comes their way; but as in the case of the Wood-pigeon, most of this is grain left uncovered by the harrow, which would never have germinated in any event. Sprouted grain does appear amongst the crop-contents of one bird, killed on 16th April 1910, and reported on by Miss Florence (*Trans. High. and Agric. Soc.* for 1912, p. 180); 287 grains were counted, of which 25 were "sprouted"; but this large quantity of grain suggests that the bird had discovered the site of a recently threshed-out corn-stack, where, of course, plenty of spilled grain, both sprouted and unsprouted, is usually to be found; and in the absence of any evidence on the point, the crop contents cannot be accepted as proof of actual damage of any kind. Perhaps among the worst "injuries" attributable to Pheasants is their habit of dusting themselves among the furrows of a ripening potato field, and so uncovering some of the tubers to the air, and their sitting about on "second-growth" clover and grass, which twists it, and renders it difficult to cut at these particular spots; but the actual loss under either of these heads cannot amount in all to anything very material.

Be it remembered also that a Pheasant is in itself a valuable food product, with smaller bones and more flesh, weight for weight, than a domestic fowl, and normally cheaper to buy.

Dr Collinge's exhaustive analyses of the crop-contents of 183 Pheasants, obtained from all parts of the country, and at various times of the year, are given in a paper

contributed in December 1913 to the *Journal of the Land Agents' Society*. The whole paper is worthy of careful consideration by the authorities before any further and more drastic campaign is instituted against the Pheasant, the direct effect of which on agriculture might be much more injurious than helpful. Without giving the actual schedule of crop-contents, it is sufficient to say that these disclosed the remains of over 100,000 injurious beetles and other insects, larvæ, and slugs; that there was a varied assortment of vegetable refuse such as beech mast, wild berries, weed seeds, and so forth, in a very large number of instances, the actual "occurrences" being 421, but the individual numbers not counted; and that the total number of husks and fragments of corn of any kind was 37.

In a paper by Mr P. H. Grimshaw, of the Royal Scottish Museum, published in the *Scottish Naturalist* for November 1912, the crop-contents of a single young cock Pheasant from Argyllshire are recorded as follows:—

Insects—Diptera: *Bibio lepidus* . . .	2286 specimens
„ Coleoptera: *Lochmæa suturalis* (Heather Beetle)	508 „
Sundries—Ants, grasshoppers, etc. . .	6 „
	2800 specimens

and along with these, numerous tubers of the Lesser Celandine (*Ranunculus ficaria*), many fragments of leaves of the Bulbous Crowfoot (*Ranunculus bulbosus*), and other heterogeneous vegetable matter, most of it noxious.

The damage occasioned by the Heather Beetle is now only too well known. Large patches of heather, varying in size from a few yards square to hundreds or even thousands of acres, turn a rusty red, or withered grey colour, and such areas are entirely useless for food, for neither cattle, sheep, nor grouse will touch it. The fact that this worthless condition of the heather is solely due to the action of this beetle was first established by Mr Grimshaw himself, in the course of his work as a member of the scientific staff of the Committee appointed to

investigate the subject of Grouse Disease, 1906 to 1910. Previously the condition was commonly attributed to the action of frost, and the foxy-red patches of heather were styled "frosted." But nothing is more certain than that the whole injury is due to the ravages of the Heather Beetle (see "The Grouse in Health and in Disease," being the *Final Report of the Committee of Enquiry on Grouse Disease*, 1911, p. 414 ff.). Only two remedies for the evil are suggested, namely the burning of the heather in the height of summer, which is the only season of the year at which burning can reach the pest, and encouraging those birds which feed on the beetle. Burning the heather between May and August might probably do more injury to the grazing value of the moors, as well as to the Grouse, than even the results would justify, and it seems as if we must in this, as in many other matters, rely upon the eyes and appetites of birds. So far, the only birds which have been found to feed upon the beetles are Black game and Pheasants. Black game devour them by thousands, and so do Pheasants; but Grouse never touch them. And to-day both Black game and Pheasants are recommended for wholesale destruction by the Board of Agriculture, without distinction of district or topography.

The whole subject does in truth call loudly for systematic, impartial, and continuous investigation, judiciously undertaken by trained minds. I do not know whether the German Board of Agriculture has a department charged with the duties of such research, but while we have heard much in recent days of the degree in which German agricultural results surpass our own, no one has yet dwelt upon the masses of birds of every class and kind which in happier times have gladdened the eyes of every student of bird-life, who has taken a country walk in that beautiful land. I hope that Dr Collinge's suggestion of a Chair of Economic Ornithology to be founded in connection with one of our Universities, may receive most earnest consideration; for only by an investigator equipped with ample funds, and with discretionary powers as to the securing of specimens, provided also with the necessary time for

the patient elucidation of a very intricate problem, will results be achieved which are not fraught with the risk of serious injury to the very interests which it is intended to subserve.

TAYFIELD, NEWPORT, FIFE,
April 1917.

Mountain Hare at North Berwick.—On the evening of 12th April, as I was returning to North Berwick and was passing a ploughed field between the foot of the Law and the western outskirts of the town, my attention was arrested by an almost white Hare crouching among the dark clods at about 25 yards distance. The ears were dusky and the back of a dull slate colour, but the general effect produced as the animal hirpled leisurely away was that of whiteness contrasting strangely with the rich red of the surroundings. In contradistinction to several common Hares observed that evening, this animal appeared ill at ease and hesitating in its course, as if aware of its conspicuousness, and I presume its presence on such low ground can be accounted for by the recent heavy snowfalls on the distant Lammermoors.—P. J. C. McGREGOR, North Berwick.

Note on an Unrecorded Occurrence of Remains of the Elk in Perthshire.—Through the courtesy of Colonel Smythe, of Methven, I was lately enabled to examine an antler of the Elk (*Alces machlis*) which has hung in the hall at Methven Castle for more than a century. It was got in 1801 in a marl pit in the Old Glebe Meadow, between Methven Castle and the village of Methven, 7½ feet below the surface. There are only other two records of Elk remains in Perthshire so far as I am aware—one at Marlee, and the other at Airleywight. The specimen, which consists of a single left antler, measuring 27 inches across by 23 inches in length, has been identified by Dr James Ritchie. A cast of it is being prepared for the Perthshire Natural History Museum, which will then contain local examples of the following sub-fossil mammalian remains—*Bos primigenius*, *Bos longifrons*, Red Deer, Elk, and Beaver.—HENRY COATES, The Museum, Perth.

Bird Notes from North Uist.—I have compiled a list from observations made in North Uist during a month's furlough in part of February and March of this year. As my last stay in the Hebrides was in 1914, the birds mentioned, with exception of the Linnet, are taken in contrast with occurrences entered in my notes for the beginning of that year.

The Blackbird (*Turdus merula*) has considerably increased, now almost as common as the Song-thrush though still more local.

On 24th February I noticed, among some stunted shrubs growing on Vallay Island, a pair of Linnets (*Linota cannabina*). They were exceedingly tame, allowing me within two or three yards. They remained until the 27th, after which date I lost sight of them. The late Mr Harvie-Brown did not admit this species in his avifauna, chiefly owing to confusion arising between it and the Twite (*Linota flavirostris*), which is by far the commonest of the passeres in the Outer Islands. These are the first I have seen or heard of in North Uist—though frequent reports come from Barra. The Starling (*Sturnus vulgaris*) has now become a perfect pest. Sea caves formerly inhabited by countless Rock Pigeons have now been entirely commandeered by these birds. The Skylark (*Alauda arvensis*) is still on the increase—song first heard on 8/2/17. The Short-eared Owl (*Asio accipitrinus*), though sadly declining in numbers, is still a resident species. Formerly a pair or two of Hen Harriers (*Circus cyaneus*) were to be seen quite often, but now they are very scarce. Single Greenshank (*Totanus canescens*) are seen occasionally, although a few years ago they were very numerous. Large flocks of between two and three hundred Bar-tailed Godwits (*Limosa lapponica*) were seen on 20/2/17.—F. S. Beveridge, 2nd Lieut., Royal Scots.

Unusual Birds in Berwickshire.—An immature female Hen Harrier (*Circus cyaneus*) was shot a few miles from Duns on 10th February 1917. The Hawk was observed to pay frequent visits to some oat stacks situated in a field where numbers of small birds were feeding, and advantage was taken of this to stalk and shoot it. It was in good plumage and condition.

An adult female Smew (*Mergellus albellus*) was shot on the Tweed, near Paxton, about the end of December last.—T. G. Laidlaw, Duns.

SOME REMARKS UPON THE OCCURRENCE OF TWO RARE WOODLICE IN SCOTLAND

By Walter E. Collinge, D.Sc., F.L.S., Carnegie Fellow, and Research Fellow of the University of St Andrews.

My appeal for specimens of the woodlice of Scotland (*Scot. Nat.*, 1916, p. 120) has brought me very many new records from all parts of the country, which have added considerably to our knowledge of the distribution of these crustacea; but it is only during the past month that I have received any species hitherto not known to occur in Scotland, or that may be regarded as uncommon.

In a recent collection, forwarded by Miss Æ. J. Jardine, to whom my best thanks are due, I find examples of *Porcellio rathkii*, Brandt, and a single specimen of *Haplophthalmus danicus*, Budde-Lund. Both species were obtained in a garden at Helensburgh, Dumbartonshire.

The former species has been recorded from a large number of English localities, but this is the first record of its occurrence in Scotland, whilst the latter species has been recorded from the counties of Ayrshire and Lanarkshire.

In company with these two species there were numerous examples of *Trichoniscus pusillus*, Brandt, and the beautiful variety *violaceus*, Schobl, *T. roseus* (Koch), *Oniscus asellus*, Linn., *Cylisticus convexus* (De Geer), *Porcellio scaber* var. *marmoratus*, Brandt, *P. pictus*, Br., and very fine examples of its variety *aureomaculatus*, Cllge.

As there is no reason to suppose that either *Porcellio rathkii* or *Haplophthalmus danicus* are less common in Scotland than in England, I propose to offer a few remarks upon the distinguishing characters of each.

Porcellio rathkii, Brandt.—This species, especially in female specimens, is subject to a wide range of colour variations and also in the extent to which it is tuberculated. Webb and Sillem[1] wrongly state that it "has a smooth body."

[1] *The British Woodlice*, 1906, p. 34.

Sars[1] says that the dorsal face is rather convex "and slightly tuberculated," but I have many specimens, from various localities, in which the tubercles are both large and numerous. The lateral cephalic lobes are well developed, terminally rounded, whilst the median lobe is comparatively short and obtusely triangular. The proximal joint of the flagellum of the antenna is slightly shorter than the distal joint.

P. rathkii possesses many characters that, with little variation, are common to *P. ratzeburgii*, Brandt, *P. pictus*, Br., and *P. dilatatus*, Br., which has led Verhoeff[2] to place all four species in a separate subgenus (*Euporcellio*). Incidentally it may be remarked that this author's extremely valuable work on the genus *Porcellio* suffers considerably owing to the lack of figures of his new species, indeed in the entire absence of any illustrations whatever.

Of the above-mentioned species *P. rathkii* is most likely to be confused with forms of *P. ratzeburgii* and *P. pictus*. In the former, however, the lateral cephalic lobes are rather large and narrowly rounded at the tip whilst the median lobe is very prominent and almost semicircular. Moreover, the proximal joint of the flagellum of the antenna is about half, or very little more than half the length of the distal joint. In *P. pictus* the lateral cephalic lobes are very large, and more truncate terminally, as also in *P. dilatatus*. The median lobe is less prominent and broadly rounded. In both of these latter species the proximal joint of the flagellum of the antenna is the longer, especially so in *P. pictus*.

Haplophthalmus danicus, Budde-Lund.—This beautiful little species and its near relative *H. mengii* (Zaddach) are, I feel sure, frequently confused with various species of *Trichoniscus*, especially the yellow or whitish-coloured forms of *T. roseus*. Microscopical examination, however, clearly shows that whereas in the members of the genus *Trichoniscus* the lateral portions of all of the metasomatic segments are clearly visible, in the genus *Haplophthalmus* only the 3rd,

[1] *Crust. Norway*, 1898, vol. ii., p. 180.
[2] *SB. Gessel. nat. Freunde*, 1907, p. 256.

4th, and 5th are seen, those of segments 1 and 2 being small and concealed beneath the pleural plate of the last segment of the mesosome.

The tuberculations are subject to considerable variation, a fact not generally known. From the south coast of England I have seen examples in which they stand out as clearly defined, miniature, knob-like excrescences. From other localities I have specimens in which they are not nearly so prominent as those in *Trichoniscus roseus*, whilst in others they are only visible on the segments of the mesosome after considerable preparation.

The question naturally arises whether or not we have a third British species, in which the tuberculations are smaller than in *H. danicus* and the pleural plates of the first mesosomatic segment rather different in shape. The examination of further material will alone decide this very interesting point.

It may be of interest to point out that of the 36 British species of terrestrial Isopoda, 21 have been recorded as occurring in Scotland, 33 in England, 12 in Wales, and 25 in Ireland.

Birds under Fire.—The following notes were made at the Front by a young Scottish officer, and they have been kindly forwarded to us for use in this magazine. "On our way forward we halted beside a river, waiting for darkness to fall, close to which was some marshy ground. A number of Coots were swimming about in the river indulging in a fight on their own account, in their well-known fashion, and paying little attention to the shells which were falling close to them. But for the sound of the guns one could have imagined one's self lying on Arthur's Seat watching a Coots' fight on Duddingston. When the battle was at its fiercest a number of Partridges and Hares were observed running about No Man's Land scared almost to death, and in a wood, close at hand, a pair of Magpies were building their nest. Suddenly a shell struck the foot of the tree sending tree and nest high into the air. We heard the Cuckoo on the 25th and the 28th April."

Black Lark—a correction.—Since my record on the old-time occurrence of this species in Britain, which recently appeared in this magazine (pp. 49 and 50), I have discovered that I overlooked a notice of a further visit of several of these birds to Sussex in January 1915.—Wm. Eagle Clarke.

Red-breasted Merganser in East Renfrewshire.—On 27th January I observed a male Red-breasted Merganser (*Mergus serrator*) on the flooded quarry at Williamwood. This quarry, which is of considerable extent, lies within half a mile of the southern boundary of Glasgow. Owing to its sheltered situation and great depth it remains open when most of the water in the neighbourhood is icebound, and consequently it has proved a tempting halting-place for duck during the past severe winter. On 3rd December 1916 a female Tufted Duck, on 4th February 1917 a pair of Goldeneye, and on 11th March two male Wigeon were noticed at the quarry. The Red-breasted Merganser is an addition to Mr John Robertson's list of the birds of East Renfrew.—Hugh W. Wilson, Cathcart.

Birds and Explosions.—Sound-waves of great explosions have been found to travel for long distances from the centre of disturbance. Dr Charles Davidson records (*Nature*, 1st Feb. 1917, p. 439) that the recent munition factory explosion in London was heard about 121 miles away, while other great explosions have been distinguished at distances varying from 90 to 186 miles. A limited number of observations tend to show that throughout a large part of the area over which the sound-waves are audible, birds are affected by the disturbance. Pheasants in particular have shown signs of unrest and discomfort over wide areas both during the Jutland Battle and after the recent munitions explosion. The immediate cause of their disturbance is unknown, but it is supposed to have been either actual perception of the sound of explosion or shock caused by air-wave concussion.

Note on a Kestrel carrying a Young Rabbit.—On 26th May 1916 I came upon a Kestrel carrying a young rabbit by the head in its talons; it was a windy day, and the bird seemed to have difficulty in carrying such a weight and flew very low. Later, I disturbed the Kestrel feeding on the rabbit, the head, including the skull all but the ears and some skin had been consumed; the rabbit measured some eight to eight and a half inches.—Annie C. Jackson, Swordale, Ross-shire.

The Brooding of the Starfish, Cribrella oculata.—Several starfishes are known to shelter their young during the early stages of development, either in a special brood-pouch formed by a number of flattened plates on the upper surface or in an improvised brood-pouch formed by a bringing together of the arms in the neighbourhood of the mouth. *Cribrella* has been observed to adopt the latter method of protecting the larval forms, though the habit is not a very definite one, at least under the artificial conditions of an aquarium. Dr J. F. Gemmill (*Proc. Zool. Soc. Lond.*, Dec. 1916, p. 554) has made further observations on the development of this species at Millport Marine Station, and finds that though at least 500 eggs are laid by each mature female, none of the eggs was observed to enter into and remain in the brood-pouch formed by the closed arms. He considers that *Cribrella* is losing the habit of brooding, and that the change towards loss has advanced further on the west coast of Scotland than on the east and in Norway.

Limax cinereo-niger near sea-level in Banffshire.—Miss J. Gowan has sent me a half-grown example of *Limax cinereo-niger* var. *maura*, the extreme black form, which she found on the 2nd May in a wood near a stream at Cullen, in company with a young example of *Arion ater* var. *nigrescens;* she also sent at the same time a half-grown *A. ater* var. *swammerdamii* from under a watering-can which had stood in the garden at The Wakes, Cullen, all winter. The occurrence of the former at sea-level is interesting, as we usually have it from mountain or moorland woods. I have previously seen this species sent me by the late Dr George Gordon, taken by him in Glen Fiddach, Banffshire, 17th July 1891, at 800 feet elevation; this was a three-quarter grown example of the var. *vera*, and occurred in company with *L. arborum* var. *alpestris*. So Miss Gowan's example is the second on record for the county.—W. Denison Roebuck, 259 Hyde Park Road, Leeds.

Limax flavus in Lanarkshire.—Mr William Rennie, of Glasgow, who has sent me many things lately, sent me a number of slugs taken in Cadder parish, near Glasgow, on the 9th April 1917. In addition to the usual common forms, this lot included a young example of *Limax flavus*, the Yellow or Cellar Slug, an addition to the authenticated fauna of the county. My list of Lanarkshire Mollusca, read before the Natural History Society of Glasgow, is to be published in *The Glasgow Naturalist*. I hope readers who can send me Lanarkshire mollusca for record for this list will do so.—W. Denison Roebuck, 259 Hyde Park Road, Leeds.

The Marsh Slug in Banffshire.—I have had two consignments of slugs and snails from Miss J. Gowan of Cullen, taken at that place on the 24th and 29th April. The latter one contained a very young example of *Agriolimax lævis*, a species of which I have never seen a record for the county. The other species were *A. agrestis*, very dark examples of var. *reticulata*, *Arion ater* var. *nigrescens* and *fasciata*, *A. hortensis*, *A. circumscriptus*, *A. intermedius* var. *grisea*, *Vitrina pellucida*, *Pyramidula rotundata*, *Zua lubrica*, *Helix hortensis* var. *lutea* 12345, *Helicigona arbustorum* type, and *Hyalinia nitidula*. I shall welcome assistance of this kind from any locality in Scotland.—W. Denison Roebuck, 259 Hyde Park Road, Leeds.

Occurrence of Testacella scutulum in Perthshire.—Specimens of this interesting slug were brought to me on 26th April from Dunbarney, near Bridge of Earn (Perthshire Mid. v.c., 88), where it seems a colony has been established in the gardens for some years. This is the first record for Perthshire, the only other Scottish authenticated records being Renfrewshire, 76; Fife and Kinross, 85; and Stirlingshire, 86. The specimens, which are of an exceptionally bright yellow colour, have been examined and authenticated by Mr J. W. Taylor, and are now in the Voucher-Collection of the Conchological Society at Manchester. Mr Roebuck asks me to say that he will be glad if local observers will keep a lookout for this species in other vice-counties, and also for *T. haliotidea*, Drap., which has hitherto only been authenticated in Scotland from Kirkcudbrightshire, 73.—Henry Coates, The Museum, Perth.

Food Value and Medicinal Use of Shellfish, etc.—In the present times of scarcity, it seems a pity that no general attempt has been made to utilise shellfish as food. It may perhaps, therefore, be worth drawing attention to the fact that Pholas is excellent eating, also that several species of Mollusca not commonly used are nevertheless edible. *Mactra subtruncata* was formerly used as pig-food in Arran (see Woodward). The Limpet, they tell me here, has a medicinal action on pigs (aperient), and must, therefore, only be used occasionally. Cats can be fed on the Limpet boiled, and the fishermen eat it either boiled or raw, while some people pickle it in vinegar.

The late Dr Clayne, of Castleton, Isle of Man, frequently prescribed the seaweed *Iridea edulis* as a vermifuge. This seaweed is

called the "Fresh-water Dullish" by the country people in the Isle of Man, and this use of it is well known to them. It grows by preference—a fact not usually mentioned in books—where springs come down the rocks to the sea; hence the name.

The Common Dulse (*Rhodymenia palmata*, Manx name Dullish) is sometimes credited with the same action, but possibly the two plants are confused by those who gather them. About the usefulness of the *Iridea* there is no doubt, but I have written to Kew and find that no such use of any British seaweed is recorded there. The "Corsican Moss" seaweed is generally employed for this purpose, and is sold by chemists; but why should not the British seaweed be preferred? It is possible that, besides in the Isle of Man, it is used in other out-of-the-way island places, where ancient plant-lore still survives among the country people.—Beatrice Lindsay, The Isle of Man.

[With a view of spreading the knowledge of and increasing the use of edible molluscan shellfish, a collection of such forms as are or have been used as food in the British Isles has recently been put on exhibition in the Royal Scottish Museum. In the arrangement followed the shellfish have been grouped in four categories according to the areas in which the collector is most likely to find them in their natural haunts. Of the thirty-one species shown, four occur on land or in fresh water, thirteen in sand or mud, six on shore rocks, and eight in deep water beyond the limit of low tide. Some of the species, such as Oysters, Cockles, Mussels, and Razor-shells are very widely used, while the use of others, such as the Heart shell, *Isocardia cor*, or the "Butterfish" or "Purr," *Tapes decussatus*, is confined to limited areas, sometimes as in the case of the former, because of the local distribution of the mollusc, or more often, as in the case of the latter, on account of local and irrational prejudices against its use. The latter species, found in muddy sand and gravel between tide-marks from Shetland to the English Channel, is seldom eaten in these Isles, notwithstanding that it is a favourite dish in the sea-board countries of the European continent, and in spite of the fact that the Channel fishermen who make use of it as food consider it more wholesome than even Mussels or Cockles. Other forms once much used seem to have dropped out of the running as human food, simply on account of the tendency towards greater luxury and ease in eating. The Limpet nowadays is used entirely for bait, but in the times of our prehistoric and mediæval forerunners it formed a staple food of the coast-dwelling population; and the sole reason for its disuse seems to be that boiling renders its "foot" a shade too tough for our degenerate jaws.—Eds.]

Megalomus hirtus, L., in Kincardineshire.—In the April number of the *Entomologist's Monthly Magazine* (p. 87), James J. F. X. King records that in July last he took "a short series" of this rare Hemerobiid by sweeping the herbage along the cliffs at Muchalls, where a specimen was taken some years ago by Professor Trail of Aberdeen.

The Agricultural Importance of "Daddy-long-legs."—That the "leather-jacket" larvæ of the "Daddy-long-legs," or Crane-fly, have still to be reckoned with in agricultural operations is very clearly shown in an interesting inquiry into their habits and economic significance which has just been published.[1] General observations on the growth of oat crops have shown that in the fortnight or so between sowing and brairding, the period specially susceptible to leather-jacket attacks, from one-tenth to one-third of the crop has been destroyed even where the larvæ were not overwhelmingly numerous. Laboratory experiments give even a worse result, for out of 92 seeds planted in an observation cage along with about 25 larvæ, Dr Rennie found that 58 or 63 per cent. were damaged as seeds or in their early stages of growth by being devoured or having rootlets or plumule bitten through. The weather conditions which favour the larvæ are discussed, as well as many points regarding the appearance, development, and migrations of the Crane-fly grubs; and the general observation is made that early sowing of oats lays the crop open to more risks than late sowing, especially in the later districts. An instructive figure of the larvæ at work underground and other drawings illustrate the paper.

[1] J. Rennie, "On the Biology and Economic Significance of *Tipula paludosa*," *Ann. Applied Biol.*, vol. iii., January 1917.

REPORT ON SCOTTISH ORNITHOLOGY IN 1916

INCLUDING MIGRATION

BY

LEONORA JEFFREY RINTOUL AND EVELYN V. BAXTER

Hon. Members British Ornithologists' Union, etc.

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REPORT ON SCOTTISH ORNITHOLOGY IN 1916,

INCLUDING MIGRATION.

Introductory Remarks.

Thanks to our excellent staff of keen and competent recorders, we are able to keep up the Reports on Scottish Ornithology which have now been published for a considerable number of years, and present that of 1916. Work of this kind is carried on with ever-increasing difficulty in these troublous times, but the quality of the notes sent in is quite up to the usual high standard, and if the amount received is not as large as in former years, this is in no way the fault of the recorders themselves but is entirely due to the exigencies of the situation. Death has, alas, robbed us of several of our most faithful correspondents. We have to mourn the loss of that veteran ornithologist Dr Harvie-Brown, and other good friends we have lost in 1916 are—J. B. Hough, New Galloway, George Stout, Fair Isle (killed in action), William Tulloch, Ardnamurchan, John Campbell, Bass Rock, and John G. Thomson, Pentland Skerries, all of whom sent us regular notes, and whose help and kindly interest we shall much miss. More, too, of our correspondents have joined His Majesty's forces and are therefore unable to help us, at any rate to the same extent as of yore. But in spite of these losses we have been sent a splendid series of notes, for which we heartily thank our old friends, as well as those new recorders whom we are glad to welcome to our midst. We

hope that all will continue to send us their observations, and that by this time next year the efforts of this Nation and its Allies may have been crowned with glorious victory. Our best thanks are due, in the Northern group of localities, to—William Crowe and Claude Maceachern, North Unst; The Lightkeepers, Whalsay Skerries; John S. Tulloch, Lerwick; G. T. Kay, Lerwick; Arthur Nicholson, Shetland; Jerome Wilson, Fair Isle; The Lightkeepers, Sule Skerry; John Gilmour, Hellyar Holm; M. Spence, Deerness; Matthew Sanderson, North Ronaldshay; John Bain, Swona; and the Pupils of the Sutherland Technical School, Golspie. In the Eastern group to—Annie C. Jackson, East Ross; W. Berry, Lentran; Robert Clyne, Cromarty and Butt of Lewis; Jane Gowan, Cullen; Alex. Macdonald, Durris; D. Hamilton, Braemar; Douglas G. Hunter, Arbroath, etc.; John B. Henderson, Bell Rock; Professor L. R. Sutherland, Dundee; Henry Boase, Dundee; George Cuthill, Alyth; James Webster, Nevay Park; Henry Coates, Perth; W. Berry, Tayfield; Z. G. S. Wedderburn, Fife; M. Lumsden, Cupar; A. Brown, St Andrews; J. H. Gaskell, Largo; N. M. Johnson, Kirkcaldy; William Eagle Clarke, Edinburgh; William Evans, Edinburgh; A. J. Rintoul, Edinburgh; W. A. Nicholson, Portobello; Sim Baigrie, Isle of May; John Pagan, Bathgate; and William F. Little, Crosswood. In the Western group to—James F. Combe, Tiumpanhead; John Morrison, Galson; W. Mouat, Barra Head; George Beveridge, North Uist; Walter Burnet, Monachs; James Campbell, Flannan Islands; D. Mackenzie, Stornoway; Seton Gordon, West Ross; Osgood H. Mackenzie, Inverewe; D. Macdonald, Kyleakin; John Lawrence, Davaar; Duncan Fergusson, Corrour; Stewart Wilson, Rhinns of Islay; William Wards, Holy Island; David A. Mowat, Pladda and Killantringan; T. Malloch, Renfrewshire and Argyllshire; John Robertson, Glasgow; Hugh W. Wilson, Glasgow; Charles Kirk, Glasgow; D. Macdonald, Kelvin Valley; Nichol Hopkins, Darvel; John Craig, Beith; and James Bartholomew, Glenorchard. In the Southern group to—the Rev. W. MacConnachie, Lauder; Andrew Anderson, Megget Knowes; T. G. Laidlaw, Duns; A. C. Gairns, Broughton; Gilbert D.

Davidson, Melrose; the late J. B. Hough, New Galloway; William Begg and George Mackie, Little Ross; J. G. Gordon, Corsemalzie; and Charles Braid, Mull of Galloway.

For the first time for many years no new bird has been added to the Scottish list, but several interesting and uncommon visitors have been recorded. The most outstanding of these are the Pied Wheatear, of which the second Scottish example was obtained on Swona, and the Siberian Chiffchaff taken at the Little Ross lantern, the first record for S.W. Scotland. On the whole, migration followed a very normal course; there were no prolonged departures from the normal in meteorological conditions, and consequently no great influxes of uncommon visitors or immense rushes of our passage migrants took place, as is the case in those springs and autumns in which certain abnormal weather conditions prevail.

With a desire to save space we have not given the uncommon visitors twice, but have merely inserted in the list a reference to the page where they will be found in detail. The following abbreviations will be used in this Report:—

1. = *The Scottish Naturalist.*
2. = *The Glasgow Naturalist.*
3. = *British Birds* (magazine).
(L.) = Lantern.
(O.H.) = Outer Hebrides.

We are again indebted to the Weather Report of the Meteorological Office for meteorological data; these are, however, very scanty, and therefore we have been unable to do more than give a very brief summary of the weather conditions in the account of migration movements under months.

Birds New to Faunal Areas, and Uncommon Visitors.

The list of Uncommon Visitors identified in 1916 is much shorter than usual; for obvious reasons it was impossible that the number of rare visitors detected should be

up to the average. There are, however, some of much interest, and we give details of the occurrences that come under this heading.

A Hawfinch (*Coccothraustes coccothraustes coccothraustes*) is recorded from Skerries (Shetland) on 7th July (J. S. Tulloch), this species being an uncommon visitor to Shetland. On 28th September a Red-breasted Flycatcher (*Muscicapa parva parva*) visited the Isle of May (1. 1917, 6), and next day a bird of this species is recorded from Swona (1. 1916, 293). A very interesting record is that of a Siberian Chiffchaff (*Phylloscopus collybita tristis*) taken at the Little Ross lantern on 3rd December (1. 1917, 33): this is the first record of this bird for Solway and, indeed, for S.W. Scotland. On 1st November a young female Pied Wheatear (*Œnanthe pleschanka pleschanka*) was taken on Swona, a most important record, being the first for Orkney and the second for the British Isles (1. 1916, 293). Black Redstarts (*Phœnicurus ochrurus gibraltariensis*), single birds in each case, are noted at Swona on 27th October (1. 1916, 293), and the Isle of May next day (1. 1917, 6), while a Nightjar (*Caprimulgus europæus europæus*) taken at Barvas (O.H.) on 18th July is the third record for the Outer Hebrides and the first for the island of Lewis (1. 1916, 288). A Hoopoe (*Upupa epops epops*) is recorded from Inverewe (W. Ross) on 26th April (Osgood Mackenzie), and one at Monkton (Ayrshire) on 30th September (1. 1916, 294). On 9th September an adult male Hen-harrier (*Circus cyaneus*) was seen flying to the S.E. at Derrie (Mochrum), (J. G. Gordon). A pair of Gadwall (*Anas strepera*) were at a Midlothian loch from April to June (1. 1916, 289), this being the first record of this duck in Midlothian, and a drake was seen on Bardowie Loch on 9th May (2. viii. 35); it is "a rare duck in Clyde." An adult male Smew (*Mergus albellus*) is reported from the Inverness Firth on 4th March (W. Berry), while an adult female was shot on Tweed at Paxton on 26th December (1. 1917, 136). A Red-necked Grebe (*Podiceps griseigena griseigena*) was found dead in Largo Bay on 28th September (1. 1917, 69), and two were seen on a Firth in the Moray area on 30th November, this being a first record for Moray

(I. 1917, 69). Green Sandpipers (*Tringa ochropus*), single birds in each case, are reported from Soulseat Loch on 10th August (J. G. Gordon), Glenorchard on 26th (J. Bartholomew), and Morton Loch (N. Fife) on 30th August, and Tentsmuir on 8th September (W. Berry). Two Dusky Redshanks (*Tringa erythropus*) are recorded from Morton Loch (N. Fife) on 30th August, and one there on 5th and 8th September (I. 1916, 287), these being the first records of this Wader for Tay. A Black-tailed Godwit (*Limosa limosa*) was seen near Arbroath on 7th September (Douglas Hunter). Two Black Terns (*Hydrochelidon nigra nigra*) were seen flying inland near Port William (Luce Bay) on 20th May (J. G. Gordon), and Little Gulls (*Larus minutus*), single birds in each case, are reported from the mouth of the Don on 3rd January (I. 1916, 79), the Kelvin Valley near Summerston between 16th and 21st May (I. 1916, 240), and near Kingsbarns (Fife), an adult in winter dress on 6th October (I. 1917, 70). This was a good year for Ivory Gulls (*Pagophila eburnea*); adult males are recorded from Mallaig on 5th February (I. 1916, 95), and the Beauly Firth on 5th and 7th February (I. 1916, 95), one at Galson on 15th February (J. Morrison), and one at North Ronaldshay on 8th November (M. Sanderson).

Extension of Breeding Range.

There are two extensions of breeding range to record for 1916. Great Crested Grebes bred for the first time on Kilconquhar Loch (E. Fife), two and possibly three pairs and young being seen several times during the summer (I. 1916, 264). This is a further spread of a species which has been increasing of late years as a breeding bird in Scotland.

On 27th May a Black-headed Gull's nest was found on Sule Skerry, the "first known to breed there." In *Studies of Bird Migration*, ii., p. 302, Black-headed Gulls are said, on the authority of Mr Tomison, to visit the island "for a day or two in the middle of summer."

Summer and Nesting.

This year, as was the case last year, the returns sent are less numerous than in better times, but the correspondents who have kept notes of nesting have sent such a good series, that we hope the information under this heading will be but little behind that of former years.

A great increase in the number of Linnets is noted in East Fife and in the neighbourhood of Dundee; in the latter locality, in addition to Linnets, Corn-buntings, Shelduck, Shoveller, Pochard, Tufted Duck, and Black-headed Gulls have all increased, and Spotted Flycatchers were more numerous than usual near Largo. From Inverewe, West Ross, we hear that Golden Eagles, Starlings, Bullfinches, Eider, and Merganser are all increasing, especially the last two species mentioned, and there is also an increase of breeding Eider reported from Tentsmuir (North Fife). Pipits were very numerous on the Isle of May this year, and a good many hatched out two broods of young; both Rock and Meadow Pipits breed on the island, but our correspondent there does not say if the increase was more noticeable in the case of one than the other. Sedge Warblers were more numerous at Possil Marsh than in 1915 (2. viii. 61), Stock-doves are becoming more common and widely spread in both North and South Fife, while from Kirkmichael we hear that Spotted Flycatchers, Willow-warblers, Lapwings, Golden Plover, Common Sandpiper, and Curlew are "more numerous, the Plovers specially so," and there is a great increase of Woodcock in Lauderdale. Guillemots are believed to have been more numerous at North Unst than in previous years, while from Cullen we have the following note: "Capercaillie are on the increase, but the keepers try to shoot them down, as, since they appeared, Blackgame have disappeared." In the winter number of *Bird Notes and News* Great Skuas are reported to have had a good breeding season, while Red-necked Phalaropes are increasing considerably in numbers. In a few cases the scarcity of some species this year may be directly attributable to the heavy storm of rain which took place on 7th and 8th July. This was certainly so with

Pheasants and Partridges, many of the young birds being drowned in the floods. We have evidence of this from East and North Fife and Forfarshire, and no doubt other localities were also affected. But there are, in addition to these, other species which are reported as scarcer than usual in 1916. Whitethroats were less numerous than usual at Possil Marsh (2. viii. 61), while Wheatears were unusually scarce at Corsemalzie, in the Kelvin Valley, and at Nevay Park (Meigle). There were very few Cuckoos and Corncrakes about Largo (Fife), and the latter species was only heard once or twice at Golspie (Sutherland). From Duns we have the note "1916 in this district was a very poor year for migratory and rare birds. Migrants were late in arriving and few in number compared with former years. Blackcaps were exceptionally numerous in 1915, while in 1916 I did not see a single bird. Garden Warblers were thinly scattered, and all the other warblers were much scarcer than usual." From North Unst comes the following note: "Of the Herring Gulls that nested on the cliffs this past season, after building their nests very few of them laid, and fewer still hatched out their young. Some thought the plague of rats on the cliffs was the cause, but the Skerries, where there are no rats, was just the same; not more than a dozen young being hatched where there used to be scores." Grouse and Partridges at Cullen (Banffshire) had a bad breeding season and were less numerous than usual. Wheatears, Golden Plover, Greenshanks, Snipe, Lesser Black-backed Gulls, Partridges, Blackgame, and Ptarmigan are all decreasing at Inverewe, West Ross, while Thrushes and Wagtails were in unusually small numbers at Braemar.

One of our correspondents records about twenty pairs of Red-necked Phalaropes, a large colony of Black-headed Gulls, a small one of Sandwich Terns, and a large colony of Cormorants near his station—truly a bird-lover's paradise. Three Goldfinches' nests, built within a few yards of the house at Corsemalzie, all hatched off; one was in a yew about 5 ft. up, another 50 ft. high at the top of a plane. A Goldcrest's nest built in a privet hedge was almost barrel-shaped, a small cavity being left at the top; it had no lining

of feathers, but the interior was warmly felted with wool (1. 1916, 239). Two Missel-thrushes spent the summer at Barra Head, where they are believed to have bred. A Blackbird's nest at Beith had three broods successfully reared in it in 1916, while a Stonechat's nest is recorded from Invergowrie (Forfar), the first our correspondent has found there. A most curious clutch of Redbreast's eggs were found in Lanfine Woods (Ayrshire) in June; they were much larger and rounder than the ordinary type, and all three eggs were alike. The House-martins at Beith, which in 1915 left an open space round the top of their nest, arrived this year and built up the open space: "probably they were the same birds, there were no young ones in the nest till the first week in July." A Lapwing hatched out a brood only $4\frac{1}{4}$ yards from the nearest rail of the Ardrossan line at Williamwood, Cathcart (1. 1917, 6). A pair of Gadwall were seen several times this summer at one of the reservoirs in South-west Midlothian; they are believed to have bred in the locality, though the nest was not found (1. 1916, 289). Goldeneye are again recorded from Soulseat Loch, and large numbers of Black Scoter in Largo Bay all summer. Merganser bred on Loch Lubnaig (Perthshire), and a nesting colony of Stock-doves was located at Kirkmichael in June. In early July, two Woodcocks' nests, one with three, the other with four eggs, were found practically touching one another. The females were sitting together, but being unfortunately disturbed by foresters, they forsook. The ground colour of the eggs of one brood was pale bluish grey, of the other olive brown; these nests were found near Lauder. The mortality among young Kittiwakes and other cliff birds was very small this year on the Isle of May in comparison to what it is some seasons. On 3rd June a Redbreast, a young Starling, two adult Gannets, a Manx Shearwater, several Kittiwakes, and a great many Razorbills and Guillemots were found dead in Largo Bay, three or four of the Guillemots were in full winter plumage, while in mid-July Eider, covered with oil, were seen (dead and alive) on the shore at Dirleton.

The earliest record we have for 1916 comes from Largo, Fife, where Rooks were seen breaking off twigs for their

nests on 30th January. On 10th February the Shags had returned to their nesting ledge on the Isle of May, and by the 26th they are reported as building at Sule Skerry. Ravens had a nest built at Beattock on 25th February; this was afterwards deserted, owing, it was thought, to persecution by Peregrines. With March come records of nesting of our earlier breeding birds; Missel Thrushes, Thrushes, Blackbirds, Dippers, and Stock-doves were building, while fresh borings of the Great Spotted Woodpecker are recorded on the 12th from Williamwood and Giffnock district. The late cold season, however, delayed these early nesters, and we have such notes as the following: "Rooks began to build a few days earlier than usual at Dundee, but the completion was delayed by bad weather"; "Rooks in Balsusney Park (Kirkcaldy) trees stayed by their partly finished nests in spite of heavy falls of snow." This was on 25th March and the Rooks had only begun to build a few days before. From the Butt of Lewis, under 19th March, we are told that the Shags there began to build, but the nest was destroyed by bad weather; and on the 31st the Isle of May reports "although the Shags have returned to their old nest, the other cliff birds have not settled yet, they are coming and going according to the weather; Kittiwakes have only newly arrived." In April the nesting of all our common breeding birds was in full swing—Starlings, Tree-sparrows, Yellowhammers, Blackbirds, Thrushes, Mallard, Grey Wagtails, Hedge-sparrows, Great Crested Grebes, Wood-pigeons, Stock-doves, Lapwings, and Black-headed Gulls all had eggs or young. On the 15th two Great Spotted Woodpeckers were seen in the Castle grounds at Lauder, where they nested later, both old and young being seen. The species is also recorded from several other localities along Leaderside. Thrushes had flown at Corsemalzie on 30th April, and on the same day a Stonechat's nest with four young two or three days old was found there. Black-throated Divers were nesting by a loch in West Inverness-shire during this month. By May the summer visitors had begun to nest and second clutches of early breeders are recorded. A colony of Jackdaws in a wood near Mochrum, visited on 3rd May, was found to have

eggs in all stages of incubation, two nests contained young birds, five had six eggs, seven had five, one had four and one three eggs. The nests were very large structures of heath sticks lined with wool, grass, paper, etc. On 8th May a Woodcock's nest with five very large eggs was found in Castle Woods, Lauder, and yet other nesting places of the Dunlin were found in the neighbourhood of Lauder, proof that the species is increasing in the district. On the 13th young Ringed Plover were "cheeping in the shell" near Dunoon, and two broods of Stonechats flying strongly were seen next day at Loch Elrig, Mochrum. On the 21st a Willow-warbler at Dunoon was pulling material off an old nest in a hawthorn-bush to build its own nest in a bank near at hand, and at Lauder Manse, Spotted Flycatchers nested in half cocoanuts fixed to the trees there for the purpose. A nest found at Cathcart contained four Mallard's and four Pheasant's eggs, all fresh and the nest in good order, while a few feet away was a Mallard's nest with one egg. A Ringed Plover's nest "on and made entirely of dried sea-weed" was found on 30th May at the Cromarty Firth, while two nests of Water-rails are recorded from Possil Marsh during this month (2. viii. 62). Records of nesting continue throughout June, but the notes mostly refer to feeding young; a Cuckoo's egg was found in a Tree-pipit's nest at Darvel, on the 3rd, the first time our correspondent there has found the egg in a nest of this species. As the month advances notes come of nests of Great Crested Grebes, Little Grebes, Wood-warblers, etc.

The Cormorant colony in Castle Loch, Mochrum, was visited on 21st June; there were "many young, some able to leave the nest and swim off at our approach, others half grown, and some newly hatched, while there were still a good many incubated sets, and several nests contained one to five fresh eggs. Among the food lying about the island, we saw trout to ½ lb., eels to nearly 2 lb., a good many pike to about 1½ lb., one or two small perch, flounders, codlings, and other young sea-fish." The Herring-gulls had well-grown young as well as some newly hatched, while one or two nests contained eggs. "On the island were heaps of

empty shells of *Tellina tenuis* and half grown *Donax vittatus*." On the 26th June an Eider and four young and about twenty Long-tailed Tits are recorded from Raasay (I. 1916, 269). Quails were heard calling in the fields at Lauder on the 27th, they are believed to have nested there, and on the 29th a Common Scoter and eight young were seen off the shore near Wick. On 2nd July six pairs of Fulmars were found nesting at a place on the cliffs between Berridale and Wick, and throughout the month come notes of fledged young of nearly all our breeding birds. There are rather late records of the hatching of Common Sandpipers and Wigeon, a nest of the former with newly-hatched young being seen at Darvel on the 6th July, while a Wigeon's nest in Ross-shire hatched next day. In August, too, we have notes of young from all districts: a late nest of the Stock-dove containing two eggs was found near Tarbatness on 16th August, and a Nightjar at Corsemalzie had two young, just flying, on the 28th. There are a few records of belated nesting in September: a Barn Owl about a month old was caught in an old pigeon loft at Mochrum Manse on the 7th, on the 12th a Greenfinch and four young were seen at Darvel, on the 14th a House-martin was feeding young at Elgin, on the 17th seven young Partridges about a week old were found at Corsemalzie, and lastly a Swallow had five young at Darvel on the 24th.

Winter.

During the winter of 1915-16 Skylarks and Corn-buntings were unusually numerous at the Butt of Lewis, large flocks of Goldfinches are recorded from Wigtownshire in January, and Hawfinches up to eight in number were seen in Lauder manse gardens in February. Numbers of Redwings and Fieldfares wintered in East Fife, Blackbirds are recorded in winter from Lerwick and Deerness (Orkney), and Redbreasts from the latter place and Barra Head, these Redbreasts being probably winter visitors from the Continent. Two pairs of Stonechats spent the winter at Durris (Aberdeenshire), while Wood-pigeons and Stock-doves were

in unusually large numbers in Wigtownshire, some 8000 being "killed in a few farmers' shoots." Gannets were seen at the Monachs and the Isle of May in January, several Ivory Gulls were recorded in February, and a good many Little Auks were driven on to our shores in the latter half of January. Goosander, Merganser, Guillemots, and Razorbills were absent from the Tay Estuary all the winter of 1915-16, while hardly any Duck were present on Lindores or Morton Lochs (Fife) up to 17th January 1916. With the exception of the above there is nothing worthy of record in the period under review. The winter of 1916-17 shows goodly numbers of our ordinary winter visitors, more Hoodies than usual were seen about Largo (Fife), while unprecedentedly large flocks of Mallard were in the sea off Kingsbarns (Fife) all winter, and Goosander were more numerous on Tweed than usual, there being an unusually large percentage of adult males. Redpolls were very plentiful this winter at Corsemalzie (Wigtown), and from Lauder we have a note of a Pied Wagtail wintering at, or near, the manse. Our correspondent there writes: "This is the first time in ten years' observation that I have seen one spend the winter with us; we stand 600 feet high." Blackbirds and Redbreasts again wintered at Lerwick: it seems safe to assume that the latter, at any rate, were continental immigrants. During the latter half of November and all December numerous records come of Little Auks wrecked on our shores, some being driven quite far inland.

Ringing.

There are not many returns of ringed birds to come under this heading this year. A Missel-thrush, ringed in Dumfriesshire on 19th May 1913, was recovered in Co. Tipperary in January 1916 (3. x. 61); this westerly movement is always shown in birds ringed in Scotland and recovered in Ireland, and another case of it is a Curlew, marked at Kinnelhead, Beattock, in June 1916, and recovered in Co. Donegal in September of the same year (3. x. 223). A Cormorant marked on the Farne Islands on 2nd August

1913 was recovered at the mouth of Tweed in April 1916 (3. x. 63), while of two Gannets ringed on the Bass Rock, one in July 1913, the other in September 1914, the former was recovered at Nieuport Bains, Belgium, in January 1916, and the latter off St Abbs in July 1916 (3. ix. 269, and 3 x. 222). A Mallard marked at Stranraer in February 1915 was recovered at Corsewall Point in January 1916 (3. ix. 269), and a Redshank ringed at Balachraggan, Ross-shire, in June 1914 was recovered at the Cromarty Firth in September 1916 (3. x. 222). Perhaps the most interesting record under this heading for the year, is of a Sandwich Tern, ringed at the Farne Islands in July 1914 and recovered at Tarbatness, East Ross, in August 1916; the bird did not appear to have bred (3. x. 151). There are sundry records of Black-headed Gulls, some ringed in England and recovered in Scotland, others ringed in Scotland and recovered in England. Thus, two birds ringed at Ravenglass, Cumberland, the one in June 1912, the other in May 1913, were recovered, one in Kirkcudbrightshire in January 1916, the other at Glasgow in August 1916 (3. ix. 271, and 3. x. 224). Another of this species ringed at Castle Loch, Wigtownshire, in June 1916, was recovered in Northumberland in September (3. x. 223), and yet another ringed at Cleuchhead, Dumfriesshire, in July 1912, was recovered at Penpont in the same county, in June 1916 (3. x. 223). There are two records of Blackbirds retaken at the place of ringing after a lapse of nearly three years; a Swallow, ringed at Broughton, Peeblesshire, in July 1912, was recovered at the same place in May 1916 (3. x. 62). We have referred only to the Scottish records of ringed birds; the reader should consult the papers quoted from for other interesting returns.

Plumage.

On 5th April a cinnamon variety of the Rook was seen near Aberdeen, and a bird of this species is reported from Bruntsfield Links, Edinburgh, with white feathers in its wings, the right wing being much whiter than the left. This is the third winter this bird has been seen there, it was first

noticed this season on 9th November. Another Rook with some white secondaries and a good many white feathers elsewhere was observed at Thornton (Fife) on 27th March, and yet another with white in the wing was seen at Beith. This year we only have one albino Starling recorded, viz., from Scone on 3rd August: the bird was pure white and was with a flock of its normally coloured brethren. On 15th September a pure white Linnet was seen at St Andrews, a House-sparrow with white scapulars in the left wing spent the summer at Cromarty lighthouse, while birds of the same species are reported from near Largo (Fife) on 2nd March and 29th June, the former with pale grey head and patches of the same colour on both wings, the latter with white secondaries in one wing. A Reed-bunting, all mealy white except the lores and ear-coverts which had some dark markings, visited the Kelvin Valley on 12th November, and an albino Skylark was shot near Cullen (Banffshire) in the first week of October. On 25th March a Thrush, on the banks of the Kelvin, had a dull white zone across the rump, while a Blackbird, pure white with only one black feather, which is in its wing, has frequented the Morningside district of Edinburgh for two winters. "This winter it has been accompanied by another Blackbird with variegated plumage; the head and back of the latter are white, or nearly so, the other parts black and white, the breast being striated." An albino Ringed Plover was seen on the beach at Cullen on 11th and 27th October (1. 1917, 47), while a greyish white Lapwing nested this season in a field on the farm of Mains of Kelly, Parish of Arbirlot, Forfarshire. It arrived in spring, spent the summer there, and left in August. Under date of 24th October our correspondent at the Rhinns of Islay records a Water-rail at the lantern with a white spot about the size of a threepenny bit on the top of its head. A female Pheasant was shot at Barnbarroch, Kirkinner, which was assuming male plumage; it had green head and neck, white ring, and somewhat tawny breast.

A Crow, "evidently a Carrion × Hoodie, with a saddle of grey," was seen in a gamekeeper's larder at Lauder (Berwickshire), and a pair of Crows and three young were

seen in the Arbroath district on 5th September: "one parent had the underparts grey, the mantle black; the other was a Crow and the young were all black."

In the end of April or first week of May a Black-headed Gull was found dead in a gullery, partly in immature plumage (wings and tail) and partly in mature plumage; the black hood was perfect. "It is a male and apparently a breeding bird" (W. Evans). And at Tentsmuir, on 21st June, a bird of the same species was found dead beside a nest in a most interesting stage of plumage: the black hood had a sprinkling of white feathers, there were strong marks of immaturity on the wing coverts, and a black bar across the end of the tail. Unfortunately the bird was in too advanced a stage of decomposition for the sex to be determined, and it was impossible to say whether it had bred.

Food, Habits, Etc.

Notes on the persecution of Rooks by Carrion Crows were again sent from Beith, but as these have appeared *in extenso* in the *Scottish Naturalist*, 1917, p. 69, it is unnecessary to do more than allude to them here. On 28th August about 6 P.M. eight or nine Spotted Flycatchers were watched feeding on flies over a big pool in the Malzie Burn, Corsemalzie, and one was seen several times to alight on the still water. During the cold spell of northerly wind in the beginning of June, a pair of Pied Wagtails at Lahill (East Fife) built a protecting rampart round the north side of their nest as a shelter (I. 1916, 264). A Whinchat near Cathcart on 18th May was heard imitating the twittering and alarm note of the Swallow, and at Corsemalzie on 24th March a Peregrine was chased by a Herring-gull which was calling and stooping at it, they circled higher and higher till nearly lost to sight. A Kestrel at Swordale on 26th May was seen carrying a rabbit, 8 to 8½ inches long, in its talons (I. 1917, 140), and a Buzzard in the same locality on 21st June was chased and mobbed by a Black-headed Gull. On 30th August a Wood-pigeon in the Arbroath district was

unable to fly "owing to severe moult." An Oystercatcher flying high to the east over the moor at Corsemalzie, five miles inland on 4th July, stooped and circled at a Herring-gull, calling loudly the while; there, too, twenty Common and one or two Black-headed Gulls on 25th March were feeding on a patch of heather burnt the previous evening. Four Common Gulls were seen on 13th June chasing a Meadow-pipit, which was eventually caught and carried off (1. 1917, 91). A female Pheasant at Corsemalzie on 19th January flying down wind killed itself against a stone dyke, and another at the same place on 12th June flew through the billiard-room window, cutting itself so badly that it died.

Migration.

SUMMARY OF MOVEMENTS.

January.

January was unusually warm and a good deal of rain fell throughout the month; the wind was chiefly westerly and often strong.

The first three weeks of January showed little movement, the most interesting items being records, during the first week, of Starlings, Thrushes, Blackbirds, Golden Plover, and Curlew at the Killantringan lantern. Having regard to the mildness of the weather, we would not have expected emigration (to Ireland?) at this season. Possibly these movements indicate immigration, the high temperature may have induced an early return of the species mentioned.

In the fourth week movements of Starlings, Skylarks, Thrushes, and Blackbirds are recorded at the Little Ross and Killantringan lanterns, and from 14th January onwards spasmodic records of Little Auks come from both coast and inland stations.

February.

The first week of February was mild; thereafter it became colder, and a good deal of snow, hail, and rain are reported.

For the first three weeks the wind was chiefly southerly and westerly, for the last week it was northerly and easterly.

Migration in February followed a perfectly normal course, returns of our breeding birds are reported, and many arrivals at nesting-places are recorded; a good deal of Duck and Wader movement took place during the third week. During the first half of the month several Ivory Gulls visited our shores, and during the last week, with strong winds from between north and east, many Little Auks were driven from their haunts in the open sea to perish on our shores.

March.

The first half of March was cold, and the wind was chiefly between north and east; more returns to inland nesting-places are recorded, these increasing in numbers towards the end of the period. Further records of the destruction of Little Auks come from our coasts, and the first of the summer visitors, in the shape of a Lesser Black-backed Gull, is recorded on the 15th. From the 16th to the 20th, with a change of wind to the south and east and a rise in temperature, a large passage movement took place. The species moving in most numbers were *Corvidæ* (Hoodie, Carrion Crow, Rook, Jackdaw), Starlings, Skylarks, *Turdinæ* (Redwing, Thrush, Blackbird), and Lapwings. From the 20th to the 28th the weather was very wintry, the wind changed to between south and west, and the movement slackened very considerably, but there was still a certain amount of passage and some summer visitors made their appearance in Southern Scotland. The last three days of the month were mild, but no increase of movement is recorded.

April.

The first half of April showed a normal temperature, the winds chiefly between west and south. During this period there were arrivals of summer visitors, some very early appearances being noted, especially Swallows and

Willow-warblers. Winter visitors were leaving us and passage migrants were moving along our shores, all in small numbers.

The third week was normal in temperature, the wind chiefly between north and east; during the first half of the week there was little movement, but towards the end a good deal of migration is recorded, chiefly arrivals of summer visitors. With a considerable rise of temperature in the fourth week and the wind between south and west, there was an extensive movement; this was largely arrivals of summer visitors, but there were a certain number of winter visitors leaving us and some passage migration.

May.

The wind throughout May was variable, and the weather as a whole was mild; there was no very big movement, but a steady arrival of our later summer visitors took place, this naturally becoming less towards the end of the month. The last of our winter visitors were leaving us, and passage migrants passing along our coasts, not in a series of rushes but in a steady trickle.

June.

The weather throughout June was cold and wet; the wind was variable, there being no prolonged spell from any particular quarter. A few late passage migrants on their northward journey are recorded, and last notes of adult Cuckoos come at the end of the month. Birds were flocking after nesting, and returns to the shore from breeding-places are recorded.

July.

The first half of July was cold and wet. The movements noted refer chiefly to Gulls, possibly driven from their nesting-places by the floods on the 7th and 8th. The normal returns to the shore of our Waders are recorded. In the

second fortnight the temperature rose and southerly winds predominated; many of our own Waders were on the move, and there were also returns of *Limicolæ* from overseas. The end of the month brought the beginning of Passerine movement.

August.

August was fine, warm and dry in the first and last weeks, and wet in the intermediate fortnight. The wind was chiefly easterly, and a good deal of movement is recorded. This comprised many arrivals of Wader as well as departures of our own breeding birds, both Passerine and Limicoline. Last records of Swifts come from many stations, sea-birds left their breeding cliffs, and one or two early winter visitors are recorded.

September.

The first fortnight of September was fairly warm, and the winds were chiefly westerly and southerly; normal departures of summer visitors took place, and there was a good deal of passage migration. With variable, rather cold, weather in the third week, there were arrivals of winter visitors, and much Duck and Wader movement. The last week was warm, with southerly and easterly winds; all the above movements were intensified, and in addition large arrivals of migrants took place, including several uncommon visitors.

October.

The first fortnight of October was unusually mild and very wet; during the first week the wind was chiefly north and east, and the strong movement noted at the end of September continued in lessening measure, *Turdinæ* predominating. During the second week the wind was south and west, and the principal feature of this period was the arrival of winter visitors. In the latter half of the month the temperature fell, the weather was very unsettled, and the

wind was chiefly south and east. A very large arrival took place in the third week, and winter visitors and passage migrants continued to be reported in numbers from many stations up to the end of the month.

November.

The first half of November was mild and wet, the wind chiefly from some southerly quarter and the rainfall heavy. After a cold snap about the middle of the month the temperature rose again and remained above normal till the 26th, when it again fell; the wind was variable. In the first week there was a good deal of movement of Starlings, Skylarks, *Turdinæ*, and Geese. This continued during the second week, with the addition of Wader, and the last of our summer migrants are noted. In the latter half of the month the same movements continued to a modified extent, and there are a good many records of Little Auks on our coasts and even far inland.

December.

The first three weeks of December were cold, and a good deal of snow and rain fell; during the first week the wind was south and west, during the second north and east, and in the third south and east. From the 24th to the end of the month the weather was of a disturbed south-westerly type and milder. For the first fortnight little migration is recorded. A distinct weather movement, evidently caused by the frost and snow, took place in the third week, after which to the end of the year there was no movement worthy of notice here.

NOTES ON THE MOVEMENTS OF BIRDS IN 1916.

ARRANGED UNDER SPECIES.

The Raven, *Corvus corax corax*.—Sixteen Ravens were seen at Whalsay Skerries on 28th April, a flock of about sixty on the cliffs at North Unst on 26th August, two at Little Ross on 25th October, and numbers at Lerwick on 24th December.

The Hooded Crow, *Corvus cornix cornix*.—Movement is recorded from the Bell Rock, the Isle of May, and Swona (Orkney) between 19th and 24th March. Last seen Largo Bay on 21st April, the Isle of May next day, and Cambo (Fife) on 24th April.

On 19th October two arrived on the Isle of May, and Hoodies are reported from Whalsay Skerries and Kingsbarns (Fife) next day, after which slight movements are noted at east coast stations up to 17th November.

The Carrion Crow, *Corvus corone corone*.—Carrion Crows were observed on the Isle of May frequently between 15th and 28th March, two at the Butt of Lewis on 2nd April, one at the former station on 20th April, two at the Bell Rock on 27th April, and one or two at the Isle of May on 1st, 8th, 9th and 10th May. On 20th October one appeared near Kingsbarns, two at the Isle of May on 23rd, and four at North Ronaldshay on 25th October. Many Carrion Crows reached the May on 28th October, and smaller numbers are noted there up to 4th November.

The Rook, *Corvus frugilegus frugilegus*.—Northward passage is recorded strongly from our stations in Orkney and Shetland between 17th and 26th March. A flock of Rooks was seen at Kyleakin (Skye) on 31st August going south, three birds at Swona on 20th October and 3rd November, and several all day at Kyleakin (Skye) on 18th December.

The Jackdaw, *Colœus monedula.*—Two Jackdaws appeared at Barra Head on 1st February, and between 17th and 26th March quite unusual numbers are noted on the Isle of May and smaller parties at Swona, the Muckle Flugga (Shetland), and the Bell Rock, while single birds are noted at the Isle of May on 26th April and 1st May. The only autumn record of movement is of a flock of twelve passing Little Ross on 25th October.

The Starling, *Sturnus vulgaris vulgaris.*—On 2nd January six Starlings were at the Killantringan lantern at 6 A.M. From 27th January till 8th April there are constant notes of arrivals of Starlings at lanterns and lighthouse stations in Southern Scotland. The period of maximum movement would appear to have been between 16th and 24th March. Many of these were doubtless arrivals of our breeding birds, but it is probable that a considerable number were passage migrants. Movement at our northern stations is reported between 20th February and 10th April, and probably refers to overseas emigration. The Killantringan lantern again was visited by this species on 24th and 26th April and 24th May.

Starlings were flocking at Loch Elrig (Mochrum) on 14th June and in other localities shortly afterwards.

Two appeared on the Bell on 15th August, many on the Isle of May on 16th September, and very large flocks at Barra Head at the end of that month. Throughout October and up to 3rd November arrivals are reported from our northern stations and the Isle of May, these being doubtless visitors from the Continent, while notes of movement come from our southern stations and lanterns between 21st October and 17th November, these culminating in an enormous rush at the Little Ross lantern on 13/14th November from 6 P.M. to dawn. On 2nd December six were at the Pladda lantern at 4 A.M. and many at the Little Ross lantern at 1 A.M. next day, and a weather movement is noted at Pladda and Cullen (Banffshire) on 20th December and at the Isle of May on Christmas Day.

The Hawfinch, *Coccothraustes coccothraustes coccothraustes.*—Several were seen about Lauder Manse during February, and one is recorded on Skerries (Shetland) on 7th July. See p. 150.

The Greenfinch, *Chloris chloris chloris.*—A Greenfinch is noted at the Isle of May on 4th and 5th January, and one at the Bell Rock on 28th April.

The British Goldfinch, *Carduelis carduelis britannica.*—Flocks of Goldfinches are reported in Wigtownshire on 15th January,

a male at Possil Marsh on 27th February (2. viii. 58), a pair at Melrose on 24th March, and a pair near Rosebery, Midlothian, on 22nd April (1. 1916, 240). On 4th November seven were seen at Giffnock and four in East Ross on 11th December, all probably this race.

The Siskin, *Carduelis spinus*.—A flock of twenty-seven were seen at Elrig (Mochrum) on 20th January and a male at Invergowrie on 25th March. The autumn records are—a flock of seventeen at Barrachan (Mochrum) on 14th October and a Siskin at Bathgate on 30th October.

The Twite, *Carduelis flavirostris flavirostris*.—Hundreds are recorded at Kilmacolm on 6th March, an arrival at Swona on 17th March, and several on Loch Ossian side on 27th April. On 29th October Twites were numerous beside the Glen Water, Darvel, and enormous numbers were to be seen on North Ronaldshay all day on 1st November.

The Mealy Redpoll, *Carduelis linaria linaria*.—One or two were seen at Corsemalzie (Wigtownshire) on 29th February, two at North Unst on 16th September, one at Swona on 18th November, and three or four at Giffnock on 3rd December.

The Linnet, *Carduelis cannabina cannabina*.—Seven are noted at Whalsay Skerries on 15th April, one at the Bell on 17th April, and a flock of twenty near Dundee on 4th June. There were very large flocks about Bathgate in July and early August, a Linnet on the Bell Rock on 15th August, three at Swona on 17th October, four on 24th October, and one there on 3rd November.

The Common Crossbill, *Loxia curvirostra curvirostra*.—A Crossbill belonging to this race was captured near Scolpaig, North Uist, on 11th June (1. 1916, 264), and a male from Lerwick on 3rd August doubtless belonged also to the typical form.

The Chaffinch, *Fringilla cœlebs cœlebs*.—Single birds are reported from Galson (O.H.) on 5th and 12th February, while from 18th March to 26th April a good deal of movement is noted from the Isle of May, Bell Rock, and Fair Isle. On 24th March a number returned to Corrour. A Chaffinch visited the Bell on 28th September and several appeared at Little Ross on 8th October, while a good deal of immigration is reported from the Isle of May, Bell Rock, Hellyar Holm, Swona, and North Unst between 20th October and 8th November.

The Brambling, *Fringilla montifringilla.*—An enormous flock of Bramblings was seen at Melrose on 20th February (12° of frost, hills white with snow). From 20th March to 21st April northward movement is reported from Orkney and Shetland, this being specially noticeable during the last three days of the period. Last seen Beith 2nd April and Isle of May 23rd April.

The first autumn record is from the Isle of May on 15th October, and passage was observed there frequently up to 4th November; one appeared at Kingsbarns (Fife) on 18th October, a flock at North Unst on 21st October, and about thirty at Corsemalzie and one at Duns two days later, while on 31st December a flock of twenty visited North Ronaldshay.

The Tree-sparrow, *Passer montanus montanus.* — Quite common near Duns on 29th March after being absent all winter. Two were seen at Lahill on 4th May, two at Amulree (Perthshire) on 20th May, and one at Glenorchard on 10th July (I. 1916, 228). Arrivals are noted at the Isle of May on 19th, 20th, and 28th October, and a "small band" near the smithy at Torrance of Campsie on 14th December.

The Corn-bunting, *Emberiza calandra calandra.*—Arrivals of small numbers are recorded from Galson (O.H.) on 11th February, Durris (Kincardineshire) two days later, Luce Sands on 17th February, and Dundee on 19th March. A few are noted at Swona between 16th and 24th March, and three there on 6th April. One Corn-bunting visited Barra Head on 23rd October, one was seen at Aultbea (Ross-shire) on migration on 14th November, three in Wigtown Bay on 17th, and about a dozen in the Kelvin Valley on 26th November, and a flock of about twenty at Cullen (Banffshire) on 5th December.

The Yellow Bunting, *Emberiza citrinella citrinella.*—A few were on passage at the Isle of May from 20th to 24th March, at Fair Isle on 19th and 21st April, and again at the May on 25th April. One was seen at Kyleakin on 15th July, and one or two on the Isle of May on 31st December.

The Reed-bunting, *Emberiza schœniclus schœniclus.*—A Reed-bunting returned to Corrour on 14th April, and a few were on Fair Isle on 20th, 21st, and 25th April.

The Snow-bunting, *Plectrophenax nivalis.*—Small movements are recorded from the Northern Isles and Outer Hebrides up to

12th March, and on 15th March a female was seen at Corrour feeding in the patches of heather where the deer had scraped away the snow. Strong northward movement is reported from many stations from 18th March to 3rd April, one at the Butt of Lewis on 20th April, and several at Fair Isle on 21st and 25th April.

The first Snow-buntings seen in autumn were near Pittenweem (Fife) on 16th September, North Ronaldshay next day, and the Muckle Flugga lantern on 19th September at 10 P.M. Steady immigration is recorded from stations all over Scotland from 23rd September to 8th November; fresh arrivals at Sule Skerry and Whalsay Skerries on 13th November, at Swona next day, at the Isle of May on 19th and Pladda on 21st November.

THE SKYLARK, *Alauda arvensis arvensis*.—A decided movement is noted from 26th January to 5th February from Little Ross (L.), Killantringan (L.), and the Isle of May, and a "sudden increase" is reported at Dundee on 13th February. About a hundred and fifty were seen at Tiumpanhead on 20th February, and one struck the Whalsay Skerries lantern at midnight on 29th February. From 5th March to 27th April there are constant records of numbers of Skylarks from our southern stations and lanterns; doubtless the earlier were our breeding birds returning, while the later were probably birds on passage to continental breeding-places. Our stations in the Northern Isles report Skylarks from 16th March onwards; on 25th March a good many were found dead in the snow on the Isle of May. Late records, doubtless of passage migrants, come from the lanterns at Killantringan and Holy Island (Arran) on 21st May, and Killantringan at 11.30 P.M. on 24th May.

On 15th September a number of Skylarks came in from the sea at St Andrews, and on 23rd September there were a great many everywhere at Portmahomack. From 24th September to 4th October, and again from 9th October to 3rd November, a great deal of movement is recorded from our more southern stations, the height of the movement being between 26th September and 2nd October. The stations recording this are Little Ross (and L.), Dundee, Largo, Rhinns of Islay (L.), Bell Rock, Pladda (L.), Kingsbarns, Isle of May, and Kelvin Valley. The direction of movement was varied; at Dundee arrivals from the east are noted, and at Kingsbarns (Fife) arrivals were seen coming in over the sea from the east on 9th, 11th, 13th, 14th, and 20th October, while on 17th October, in the same locality, parties were observed travelling south along the coast. A recrudescence of the movement on a small scale is noted between 14th and 21st November, four

were at the Pladda lantern at 6.30 P.M. on 2nd December, while a weather movement is reported from this station, Little Ross, and Cullen from 18th to 24th December.

The Tree-pipit, *Anthus trivialis trivialis*.—The first records of this species come from Duns and Darvel on 27th April, Beith next day, Williamwood and Peebles on 29th, Lauder and Dunoon on 30th April, and arrivals are reported up to 20th May. Autumn passage is noted at Balgay, near Dundee, from 23rd July to 27th August, and again on 3rd, 4th, and 7th September.

The Meadow-pipit, *Anthus pratensis*.—An arrival is noted at Sule Skerry on 18th March, and a Meadow-pipit at Swona on 22nd March. Many arrivals are recorded from our southern stations between 28th March and 21st April, doubtless returns of our own breeding birds. On 6th and 24th April this species visited Swona and Whalsay Skerries on 29th April, while the Isle of May reports movement on 25th April, 5th and 10th May, some of these being probably passage migrants.

On 14th August a flock of about sixty were seen near Mochrum, and from 30th August to 2nd October there are many notes of movement from our southern stations, doubtless largely our own birds leaving us. Hundreds of Meadow-pipits are noted at Sule Skerry on 4th and 5th October, doubtless overseas immigrants, and on 11th October a good many were seen arriving over the sea from the east near Kingsbarns (Fife), a good deal of movement being reported there up to 14th October. On 20th December four visited Little Ross.

The Rock-pipit, *Anthus spinoletta petrosus*.—Two Rock-pipits are noted at the Bell Rock on 21st April, many at the Isle of May on 16th September, and one at the Bell Rock on 14th November. Some of these records may refer to *A. s. littoralis*.

The Yellow Wagtail, *Motacilla flava rayi*.—Is first reported from Dunoon on 21st April, and Darvel on the 25th, and many arrivals are recorded from the Clyde area up to 29th April, when over fifty are noted from Possil Marsh (2. viii. 60). On 17th May one appeared at Little Ross, while on 6th August one was caught in the byre at Meggat Knowes (Yarrow). Single birds are noted at Corsemalzie on 20th September and Williamwood on 24th September, and the last for the season at Corsemalzie on 16th October.

The Grey Wagtail, *Motacilla cinerea cinerea*.—This Wagtail was seen at Possil Marsh on 5th February (2. viii. 58), while from 18th March to 3rd April returns to breeding localities are noted. On 2nd May three were at the Killantringan lantern at 10 P.M. Four Grey Wagtails are recorded from North Unst on 28th August, doubtless passage migrants, while from 30th August to 2nd October there are many records from our southern stations, these being doubtless our own breeding birds on the move. Single birds are noted at North Ronaldshay on 27th September and Whalsay Skerries on 1st October, three at Derrie, Mochrum, on 18th October, two at Little Ross next day, and one at Craig-dhu (Glasserton) on 23rd November.

The White Wagtail, *Motacilla alba alba*.—Is first noted at Corsemalzie on 27th March, Possil Marsh (2. viii. 60) and Glenorchard on 4th April, Invergowrie and the Kelvin Valley on 9th April. After this there are many records of passage from the West Coast between 14th and 29th April, and from our Northern Isles from 20th to 25th April, while a White Wagtail was seen at Invergowrie on 4th May and two there on 9th May. In autumn we have notes of movements from our East Coast stations from 15th August to 10th October; on 9th October "quite an arrival" is reported from Kingsbarns (Fife), where this species was seen coming in over the sea from the east and alighting on the sands and sea-braes. West Coast records come in from 16th August to 8th September, when one was seen at Beith.

The Pied Wagtail, *Motacilla alba lugubris*.—From 11th March to 14th April there are many records of the return of Pied Wagtails to their breeding-places all over Scotland, the height of the movement being from 23rd March to 2nd April, while on 24th April two visited the Monach Islands. On 3rd September great numbers were seen at Errol, and from 21st September to 21st October there are many notes of movement, almost all from Southern Scotland. Last seen Isle of May on 5th November, near Stranraer "a very dark sooty" male on 27th November, and Cullen (Banffshire) on 14th December, while one frequented Lauder for the last two or three days of the year.

The Blue Titmouse, *Parus cæruleus*, subsp.?—Two Blue Tits visited Little Ross on 19th October.

The Goldcrest, *Regulus regulus*.—The spring records of movement for this species are two at the Holy Island lantern (Arran) early on 15th February, one at the Little Ross lantern at

2 A.M. on 5th April, and one at the Killantringan lantern at 2 A.M. on 6th May; the former were probably our own birds returning, the last, perhaps, a passage migrant. From 25th September to 29th October there are many records of Goldcrests from our Southern stations, probably departures of our own breeding birds. A good many arrived at Barra Head on 1st October, a few were at Swona from 28th October to 1st November, and there were great numbers on North Ronaldshay all day on 1st November, these doubtless being continental immigrants, while the five Goldcrests at the Pladda lantern at 8 P.M. on 2nd October may also have belonged to this category.

THE GREAT GREY SHRIKE, *Lanius excubitor excubitor.*—A male was found dead at Row (Dumbartonshire) on 26th February, and single birds are noted near Kirriemuir (Forfarshire) on 21st March, at Broughton (Peeblesshire) on 24th April, in mid-November in North Fife, and at Invergowrie on 16th December.

THE SPOTTED FLYCATCHER, *Muscicapa striata striata.*—Is first recorded from Rouken Glen (Glasgow) on 4th May and Loch Elrig (Mochrum) on 8th May, while from 14th to 25th May arrivals are reported from many mainland stations, the height of the movement being 23rd and 24th May. A passage migrant is noted at Lerwick on 29th May. From 2nd September a good deal of southward movement is recorded; last seen Lauder 16th September, Callander and near Largo 19th, Balgay on 20th and Corsemalzie on 25th September.

THE PIED FLYCATCHER, *Muscicapa hypoleuca hypoleuca.*—One at Duns on 4th May, while on 8th May a male and female struck the Little Ross lantern at 1 A.M. and this species arrived at Broughton. Passage migrants, females in each case, are noted at Lerwick on 26th and 29th May. Several were on the Isle of May on 28th September, one at Swona that day, and a male was killed at the Little Ross lantern on 2/3rd October.

THE RED-BREASTED FLYCATCHER, *Muscicapa parva parva.*—See p. 150.

THE CHIFFCHAFF, *Phylloscopus collybita collybita.*—The first record for the Chiffchaff in 1916 comes from Corsemalzie on 27th March, which is early. This bird is reported from Duns on 22nd April, and one (of this race?) struck the Little Ross lantern at midnight on 11th May. On 21st August a Chiffchaff is noted at

Arbroath, some at the Little Ross lantern at 1 A.M. on 30th August, three at Culzean, Ayr, on 6th September, last seen at Beith on 20th September, some on the Isle of May on 28th September, and the last for the season was killed at the Little Ross lantern on 2/3rd October and sent to us.

The Northern Chiffchaff, *Phylloscopus collybita abietinus.*—Single birds reported from Lerwick on 27th and 29th May probably belonged to this subspecies.

The Siberian Chiffchaff, *Phylloscopus collybita tristis.*—See p. 150.

The Willow-warbler, *Phylloscopus trochilus trochilus.*—The first record for 1916 is a very early one, namely 3rd April at Beith; the next are Duddingston on 17th April (I. 1916, 240), New Galloway next day, and the Isle of May and Corsemalzie on 20th April. Thereafter many arrivals are recorded up to 15th May; the height of the movement was between 27th and 30th April, when large influxes are noted. Passage migrants are reported from Fair Isle on 21st and 25th April, and a good many Willow-warblers which visited the Isle of May on 21st and 22nd May, and the Holy Island lantern (Arran) from 2-4 A.M. on the former date, probably also fall into this category. Autumn movement is first recorded on 6th August, waxing stronger as the month progressed and continuing steadily till mid-September. Last seen Summerston 16th September, Largo on 25th and Corsemalzie on 28th September. A Willow-warbler at Swona on 13th August was probably a passage migrant; the same remark applies to one at that same station on 28th September and some on the Isle of May from 27th September to 1st October.

The Wood-warbler, *Phylloscopus sibilatrix sibilatrix.*—Is first recorded from Duns and Loch Ossian side on 27th April, Lauder next day, Peebles on 29th and Darvel on 30th April, and Monreith (Mochrum) on 4th May. After this there are a good many notes of arrival up to 24th May. In autumn single birds were seen at Balgay on 8th August, Redmyre Wood (Forfarshire) next day, and Corsemalzie on 10th September.

The Grasshopper-warbler, *Locustella nævia nævia.*—A passage migrant is noted at Fair Isle on 21st April, and single birds at Beith on 28th April, Giffnock on 4th May, and Kilmalcolm on 10th May.

The Sedge-warbler, *Acrocephalus schœnobœnus*. — Is first reported at Mochrum Loch (Wigtownshire) on 28th April, Possil Marsh on 30th April (2. viii., 60), Kelvin Valley and Beith on 2nd May, and the Davaar lantern at 3 A.M. on 3rd May. Thereafter there are numerous records of arrival up to 20th May, by which time our breeding birds seemed to be generally distributed. Last heard at Beith on 20th August, one at Loch Elrig (Wigtownshire) on 2nd September, and several at the Little Ross lantern at 11 P.M. on 6th September.

The Garden-warbler, *Sylvia borin*.—The records of arrival are mostly very late this year; the first are from Duns on 4th May, Darvel and Beith on 18th May, and Birnam on 22nd May, and a large influx is noted there the following day. After this arrivals are reported up to 27th May, and passage migrants occurred at Lerwick on 30th May and from 7th to 13th June. On 30th August there were a good many Garden-warblers at the Little Ross lantern at 1 A.M.; a few seen in the Cromarty Lighthouse garden on three occasions in September, and one at the Sule Skerry lantern on 22nd October, were evidently passage migrants, as were also in all probability birds which visited the Isle of May on 28th September.

The Blackcap, *Sylvia atricapilla atricapilla*.—The first notes of this species are also late this year, being from Lauder, a male, on 10th May, and a male and female at Darvel on 18th May, and one at Callander on 20th May. A male on the Isle of May on 26th May was, perhaps, a passage migrant, and females reported from Lerwick on 29th May and 7th June undoubtedly were on their way overseas. In September one or two seen in the garden of Cromarty Lighthouse were evidently passage migrants, and possibly those on the Isle of May on 28th September should come under this heading, while on 30th September a Blackcap was killed at the lantern of the Mull of Galloway.

The Whitethroat, *Sylvia communis communis*.—Is first recorded from Corsemalzie on 26th April, the Isle of May next day, Kilconquhar on 29th April, Braidburn, near Edinburgh, on 3rd, and Beith on 4th May. After this many notes come of arrivals up to 25th May, by which time our breeding birds seem to have been here in their full numbers. A passage migrant is noted at Lerwick on 29th May. On 30th August many Whitethroats were at the Little Ross lantern, probably our own birds leaving us, and a passage migrant visited North Unst next day. Many notes of departure

come during the first half of September, last seen Balgay and Lauder on 16th September, and the Mull of Galloway lantern on 30th September.

The Lesser Whitethroat, *Sylvia curruca curruca*.—A bird of this species was killed at the Little Ross lantern at 1 A.M. on 8th May, and two were on the Isle of May on 20th May. From 4th to 8th June a Lesser Whitethroat was seen half-way between Creetown and Gatehouse of Fleet (Kirkcudbrightshire), where it may have bred, but the nest was not found (I. 1916, 264). The only autumn record is of a single bird on the Isle of May on 1st October.

The Fieldfare, *Turdus pilaris*.—Throughout January and February we have notes of small movements of Fieldfares from the Outer Hebrides, Orkney and Shetland, the Isle of May, and Killantringan lantern, but nothing to indicate a movement of any magnitude. In March the regular migration became apparent, and in April there are many notes from all parts of Scotland of the northward movement of Fieldfares. The height of the movement seems to have been from 19th to 29th April, when large numbers are reported on the move. Last seen at Little Ross on 3rd May, the Isle of May on 5th, and Lauder on 18th May.

The first autumn records come from Barra Head (O.H.) and Corrour (Inverness-shire) on 10th October, Corsemalzie and Darvel on 15th October, and the Isle of May next day. Very large arrivals took place steadily from 18th October to 5th November, and are recorded from stations all over Scotland, the period of maximum movement being from 22nd to 30th October. On 13/14th November "uncountable numbers" were at the Little Ross lantern from 6 P.M. to dawn, and from 15th November to 3rd December, a little movement is recorded from Little Ross, Pladda, and the Isle of May. A weather movement is noted at Cullen and Little Ross from 18th to 20th December.

The Missel-thrush, *Turdus viscivorus viscivorus*.—A few Missel-thrushes visited the Isle of May on 17th March, and single birds are noted at Swona on 20th March and 20th April, and at Hellyar Holm on 31st May. Flocking is reported from Mochrum on 14th June; one visited the Isle of May on 24th September, a Missel-thrush was on North Ronaldshay on 29th September, they were numerous at the Little Ross lantern on the nights of 1/2nd and 2/3rd October; at this station a flock was seen going N.W. on 11th October, and one was killed at the lantern at 10.30 P.M. on 27th December.

The Thrush, *Turdus philomelus*.—On 2nd January two Thrushes were at the Killantringan lantern at 6 A.M. From 28th January right on to 6th April there are many records from our southern lanterns of Thrushes attracted by the light, and returns of breeding birds are noted at inland stations. Birds sent from the lanterns proved to be *T. ph. clarkei*, and the main body of migrants were evidently our breeding birds returning to their nesting quarters, though there may have been some passage migrants of the typical form along with them. From 19th to 25th April Thrushes were passing our stations in the Northern Isles, this being doubtless the emigration of *T. ph. philomelus*. A Thrush was at the Killantringan lantern at 2 A.M. on 6th May, and one on the Isle of May on 27th June and 6th July.

On 30th August many Thrushes were at the Little Ross lantern at 1 A.M., doubtless our breeding birds leaving us, one at the Isle of May on 16th September, and notes of large movements from our southern stations from 24th September to 1st November; doubtless most of these were emigrant *T. ph. clarkei*. From 29th September to 5th November we have records from our northern stations of what was evidently the autumn immigration of *T. ph. philomelus*. A fresh movement took place from 13/14th November (when "uncountable numbers" were at the Little Ross lantern) up to 3rd December, and is recorded from the above station, the Rhinns of Islay (L.), Isle of May, Pladda (L.), and Cullen: it is difficult to say to which race these records should be assigned. A weather movement is reported from Cullen, Little Ross, Pladda, and the Isle of May from 18th to 25th December.

The Redwing, *Turdus musicus*.—Throughout March and April we have many notes of movement of Redwings; at first the large majority refer to our southern stations, probably passage migrants arriving from further south. Later the proportion of notes from the northern parts of Scotland increases, and emigration overseas was the main feature of the movement. Last seen Possil Marsh 22nd April (2. viii. 61), Corrour on 24th, Fair Isle on 25th, and the Butt of Lewis on 29th April.

The first autumn records of Redwings come from Swona on 28th September, Pladda lantern on 2nd October at 8 P.M., and Sule Skerry, Lerwick, and Barra Head on 4th October. Thereafter the main arrival began, and a stream of Redwings is recorded right up to 5th November. Records of this come from the length and breadth of Scotland, and the periods of maximum movement were from 19th to 23rd and 28th to 30th October. On the night of

13/14th November enormous numbers were at the Little Ross lantern, and from this date up to 21st November some movement is noted at this station, Cullen, Pladda, Swona, and the Isle of May. A weather movement is recorded from Pladda, Little Ross, and Cullen from 18th to 26th December.

The Ring-ouzel, *Turdus torquatus torquatus*.—Single birds are reported at the Isle of May on 20th, 21st, 22nd, and 26th April, at Cockburn on 22nd April, at the Rhinns of Islay lantern at 2 A.M. on 23rd April, and at the Killantringan lantern at 10 P.M. on 24th April, on which date a pair arrived at Corrour. From 5th to 10th May Ring-ouzels were on passage on the Isle of May. From 27th to 29th September several were on the Isle of May, one at the Rhinns of Islay lantern at 9 P.M. on the former date, and passage migrants at Whalsay Skerries (L.), Swona, Sule Skerry (L.), and Whiteness (Shetland) on various dates between 27th September and 26th October. Several are reported at the Little Ross lantern on 1/2nd, 2/3rd, and 30th October, and single birds at the Isle of May on 19th, 27th, and 30th October and 2nd November.

The Blackbird, *Turdus merula merula*.—Four Blackbirds were at the Killantringan lantern at 6 A.M. on 2nd January, and from 29th January to 5th February a considerable movement is recorded from the Little Ross and Killantringan lanterns and the Isle of May; where the sex is noted all were males. Movements of Blackbirds are noted from Holy Island, the Isle of May, Bell Rock, Rhinns of Islay (L.), and Butt of Lewis between 18th March and 2nd April. From 19th to 27th April there are notes of emigrating Blackbirds from many stations in our Northern Isles, and several birds of this species (probably passage migrants) visited the Killantringan lantern on 24th and 26th April and 2nd May. From 27th September to 4th November steady arrivals of immigrants are recorded from the stations in our Northern Isles, the largest numbers noted being between 19th and 23rd October, and birds at the Isle of May were probably also overseas immigrants. Blackbirds were at the Pladda lantern on 2nd and 3rd October, and from 20th October to 5th November and again from 13th to 20th November great movements of this species are reported from southern stations, chiefly Little Ross (L.), Rhinns of Islay (L.) and Pladda (and L.), but other stations also participated. The first-named station has noted the sexes in some cases: on 22/23rd October they were all young males, on the 26/27th and 28th they were all females, and on 29/30th October all were adult males; later on, the sexes are not stated. Blackbirds are reported at

Kyleakin on 27th November and 13th December, at the Pladda lantern on 27th November and 2nd December, at the Isle of May on 16th and 25th December, a migratory movement from E. to W. at Cullen on 20th December, two males on N. Ronaldshay on 22nd December, and a female there on 31st December.

The Wheatear, *Œnanthe œnanthe œnanthe*.—Is first recorded from West Linton (Peeblesshire) on 19th March, the Isle of May on 21st, Summerston (where 5 inches or more of newly fallen snow was lying) on 25th March, Nevay Park and Possil Marsh (2. viii. 59) on 28th March, and the Monachs next day. After this many arrivals are reported up to 8th April, when there is an utter blank till 15th April, after which many arrivals are again noted, and these continue throughout the month. From 18th April to 7th May there are many notes of Wheatears from our Northern Isles and Outer Hebrides, and passage is recorded steadily from the Isle of May up to 17th May. On 21st May at 11 P.M. twenty, and on 24th May at 11.30 P.M. twelve, were at the Killantringan lantern, and some Wheatears visited the Isle of May on 26th May. By 8th July this species was on autumn passage at the Isle of May and there are several records from this station during the month; on 16th July movement is recorded at Kyleakin, and on 23rd July at Balgay. During August and September there are constant notes from our more southern stations of movements of Wheatears, evidently our breeding birds leaving us and possibly also a proportion of passage migrants. The notes from our northern stations during this time are very few and do not point to any large arrivals there. On 1/2nd and 2/3rd October there were large rushes at the Little Ross lantern; last seen Isle of May on 1st October, Rhinns of Islay lantern on 4th October, Randerston (near Kingsbarns) on 15th October, Barra Head on 16th and Galson (O.H.) on 23rd October. Possibly some of the above records may refer to the following race.

The Greater Wheatear, *Œnanthe œnanthe leucorrhoa*.—Six Greater Wheatears are reported from Beith on 26th April, some on the Isle of May on 27th and 28th April and 11th May, and a female on Swona on 5th May. On autumn passage single birds are recorded near Colinsburgh (male) on 29th August, Largo Bay on 23rd and 28th September, and the Isle of May on the last-named date.

The Pied Wheatear, *Œnanthe pleschanka pleschanka*.—See p. 150.

The Whinchat, *Saxicola rubetra rubetra*.—The first records for the season come from Broughton (Peeblesshire) and the Kelvin Valley on 28th April, Darvel, Lauder, near Balerno, and Derrie (Mochrum) next day, and Dunoon on 30th April. After this the spread was rapid, and by 14th May our breeding birds seemed to be present and generally distributed. Autumn movement was first noted near Largo on 16th July, and throughout August and up to mid-September Whinchats were moving southwards. Last seen Dundee on 9th September, the Isle of May on 12th, Bathgate on 13th, and Alticig shore (Luce Bay) on 24th September.

The Stonechat, *Saxicola torquata*.—From 20th to 24th March a few Stonechats were on the Isle of May, two on the Monachs on 29th March, and several at the Killantringan lantern at 10 P.M. on 2nd May. From 7th to 16th October several were at Galson (O.H.), and one at Summerston "on passage" on 4th November.

The Redstart, *Phœnicurus phœnicurus phœnicurus*.—Is first recorded from the Isle of May on 26th April, Swona (passage migrant), Duns, and Broughton (Peeblesshire) next day, Dunoon and Loch Ossian side on 30th April. After this arrivals are recorded steadily up to 23rd May, when many put in an appearance at Birnam. A female passage migrant was seen at Lerwick on 6th June. By 23rd July autumn movement began to be apparent and is recorded at frequent intervals from our more southern stations up to 10th September. A passage migrant is reported at Swona on 30th September and two there on 1st October, and Redstarts on the Isle of May between 27th September and 1st October and again on 23rd October, and a male at Swona on 31st October, were probably also passage migrants.

The Black Redstart, *Phœnicurus ochrurus gibraltariensis*.—See p. 150.

The Redbreast, *Erithacus rubecula*.—Single birds are recorded from the Isle of May from 18th to 24th March, the Bell Rock on 26th and Kyleakin on 29th March, while on 2nd April two visited the first-named station. In the absence of specimens it is difficult to say to which race these belonged. Emigration of the typical *E. r. rubecula* is reported from stations in our Northern Isles from 19th to 28th April; one of this race is recorded from Cambo (near Kingsbarns) on 24th April (i. 1916, 265), and a large number of Redbreasts observed on the Isle of May during the above period were doubtless also continental birds on their

way north. Two at the Little Ross lantern at 1 A.M. on 26th April may also have been passage migrants. The first autumn notes come from the Little Ross lantern on 30th August and 6th September, and from 27th September to 3rd October there are many notes of Redbreasts at our southern lanterns; these were probably our own birds leaving us. On 9th October a continental Redbreast, *E. r. rubecula*, was seen at Cambo, on 28th October one arrived at Swona, and during November we have a good many notes of the arrival of continental immigrants in our Northern Isles; records from Kyleakin and the Isle of May probably refer also to the typical form. On 25th December a few visited this last station, and single birds are recorded at Lerwick on 28th and 31st December.

THE HEDGE-SPARROW, *Prunella modularis*.—Several Hedge-sparrows arrived on the Isle of May on 31st January and stayed some days. What were probably continental emigrants are reported from Swona on 20th March and 24th April, the Butt of Lewis on 6th April, and Fair Isle on 21st and 22nd April, and the birds noted at the Isle of May on 23rd March and 22nd April may also have belonged to this race. In autumn single birds are recorded from the Isle of May on 23rd and 28th October.

THE WREN, *Troglodytes troglodytes troglodytes*.—A Wren appeared on the Monachs on 11th January, and a few on the Isle of May on 31st January and stayed some days, while on 5th February one visited Galson. On 5th March Wrens are noted at Sule Skerry and the Muckle Flugga Rock (*T. t. zetlandicus?*), single birds at Kyleakin on 23rd March and Hellyar Holm on 26th March, and several at the Isle of May on 23rd April. One was at the Little Ross lantern at 4 A.M. on 25th September, and one at Whalsay Skerries lantern at 1 A.M. on 27th September. The Isle of May records arrivals of Wrens on 1st October, Little Ross on 11th October, Swona on 19th and 20th October, Kyleakin on 22nd October and 27th November, and "a lot extra" at Barra Head on 23rd October.

THE SWALLOW, *Hirundo rustica rustica*.—The first records of Swallows are very early this year, being from Barra Head on 2nd April, and Possil Marsh next day (2. viii. 60). The next notes are from Loch Leven on 13th April, Possil Marsh again on 15th April (2. viii. 60), and Killantringan next day. From this time up to the end of the month a very large arrival took

place, which is chronicled from every part of the mainland of Scotland, and arrivals are reported from breeding-places in smaller numbers up to 16th May, by which time our summer visitors seem mostly to have been present. From 26th April up to 29th May, Swallows, probably mostly passage migrants, are recorded frequently from our stations in the Outer Hebrides and Northern Isles, and this species was passing the Isle of May up to 31st May.

Two Swallows, perhaps passage migrants, are recorded from Swona on 24th and 26th July, and on 18th August numbers were seen going south along the coast near Arbroath. During the last half of September and October departures are noted steadily from many stations; last seen Darvel on 22nd October, Edinburgh on 25th, and Corsemalzie on 27th October, Kirkcaldy on 2nd November, the Isle of May on 4th and Stranraer on 12th November.

The House-martin, *Delichon urbica urbica*.—Is first noted at the Monachs, Holy Island, and Durris on 26th April, Glenorchard, Dundee, and Largo next day, Morningside on 28th, and Peebles, Broughton (Peeblesshire), and Possil Park on 29th April. After this the spread was rapid, and the quota of our breeding birds seems to have been complete by about 21st May. House-martins, probably passage migrants, were seen at Lerwick on 15th May and 20th June, and at Swona on 28th and 29th July. Departures are recorded during September, and the last records of the species are from Largo on 1st October, Beith next day, and Crail on 6th October.

The Sand-martin, *Riparia riparia riparia*.—Is first noted at Summerston on 8th April, Soulseat (Inch) on 10th, Killantringan on 11th, and Duddingston on 17th April. After this arrivals are recorded steadily up to 6th May, the height of the movement being from 26th to 30th April. On 12th May a Sand-martin is reported from Swona, and three or four birds from the Cromarty lighthouse on 16th July. Departure is noted throughout August, and the September records come from Loch Elrig (Mochrum) on the 2nd, Largo Bay on the 3rd, Dundee on 4th, Summerston on 16th, and Alticig shore (Luce Bay) on 18th September.

The Swift, *Apus apus apus*.—Was early in appearing in 1916, being recorded from Giffnock on 23rd April (I. 1917, 33), Duddingston next day (I. 1916, 240), Alyth and New Galloway on 26th, and Kirkcaldy on 29th April. After this arrivals are reported constantly from breeding-haunts up to 16th May. Swifts are recorded from Hellyar Holm on 25th June, North Unst next day,

Sule Skerry on 29th June, and Tingwall (near Lerwick) on 30th June, while on 2nd July thirty to forty were seen near Sumburgh Head, an unusual occurrence. During August there are many notes of the departure of Swifts from their summer haunts; last seen at Cromarty Lighthouse on 1st September, and Glenorchard on 4th September. One at Sule Skerry on 3rd September was doubtless a passage migrant, and a Swift seen at the Bell Rock on 28th September may have been so likewise.

The Nightjar, *Caprimulgus europæus europæus*.—Single birds are recorded from Corsemalzie on 12th May, Kilmacolm on 16th, Holy Island on 17th and Little Ross on 25th May, Barvas (O.H.) on 18th July (1. 1916, 288, and see p. 150), Corsemalzie on 10th September (imm.), and near Port William on 20th September (imm.).

The Hoopoe, *Upupa epops epops*.—See p. 150.

The Great Spotted Woodpecker, *Dryobates major*, subsp.?—Single birds are noted at Lauder on 31st January, and Corsemalzie on 9th May.

The Wryneck, *Jynx torquilla torquilla*.—Single birds are recorded from the Fraserburgh district in the second week of May (1. 1916, 239), and the Little Ross lantern during the third week of November (1. 1917, 4).

The Cuckoo, *Cuculus canorus canorus*.—Is first recorded from Lauder on 17th April, Beith on 22nd, Bathgate and Nevay Park on 23rd April. After this a very large influx is reported up to 30th April from many mainland stations, while single birds are noted at Kyleakin on 2nd May, the Killantringan lantern on 5th, 21st, and 24th May, and the Isle of May on 1st June. Return movement is noted at Sule Skerry, "the second ever known here," on 26th June. On 10th and 26th July a Cuckoo was on the Isle of May, one imm. near Kirkcowan on 10th August, one at Williamwood on 21st August, and the last for the season at Barra Head late in September.

The Long-eared Owl, *Asio otus otus*.—Single birds are recorded at Hillswick, Shetland, on 24th October, and North Ronaldshay on 4th November.

The Short-eared Owl, *Asio flammeus flammeus*.—Single birds are recorded from Sule Skerry on 19th March, and Glen Ling (Mochrum) on 24th September, Cromarty Lighthouse and Greenhills

(near Beith) in October, the Isle of May on 26th and 30th October and 20th November, and Sule Skerry on 22nd October and 6th November.

The Barn Owl, *Tyto alba*, subsp.?—Single birds are noted at Kinnelhead on 28th January and Glenorchard on 27th February (I. 1916, 114), both found dead; and on 30th January and 1st February a Barn Owl "with a dark breast" (*T. a. guttata?*) was watched hawking at Corsemalzie at 11.30 A.M. and 3.30 P.M. respectively.

The Tawny Owl, *Strix aluco aluco*.—A Tawny Owl was flushed among the rocks on the shore at Old Luce (Wigtownshire) on 20th May.

The Merlin, *Falco columbarius æsalon*.—From 5th April to 5th May in spring, and from 29th August to mid-November in autumn, movement of Merlins is recorded from our island stations.

The Kestrel, *Falco tinnunculus tinnunculus*.—Single birds are noted from the Isle of May on 26th January and 25th March, at Fair Isle on 2nd and 3rd February, and two at Holy Island on 11th February. From 16th to 29th April much movement is recorded at stations in Orkney and Shetland, while from 16th September to 18th October there are again many records of Kestrels from the Outer Hebrides, Sule Skerry, and the Isle of May, and one at this last station on 17th November.

The Rough-legged Buzzard, *Buteo lagopus lagopus*.—On 29th January "five were seen coming from the hills to roost in Lauderdale Woods; there were six earlier in the season but one was trapped."

The Buzzard, *Buteo buteo buteo*.—Single birds are recorded at Corsemalzie on 24th March and 14th April.

The White-tailed Eagle, *Haliaëtus albicilla*.—One is noted at Lerwick on 14th and 29th April, and Bressay on 11th May.

The Hen-harrier, *Circus cyaneus*.—See p. 150.

The Whooper Swan, *Cygnus cygnus*.—Five are reported from Corsemalzie on 19th February, and several at Galson up to 19th March; one shot weighed 29 lbs. On 7th May five "Swans" were seen at Barra Head, and on 18th June a Whooper arrived at Strand Loch, 5 miles north-west of Lerwick, and stayed till

about 1st July. On 21st November three appeared at Corsemalzie, and three in Nigg Bay on 11th December, and next day we have the note from Aultbea (Ross-shire), eight Whoopers (two young) "visited a loch here for several days but have passed on." On 30th September four "Swans" visited North Ronaldshay, and one was seen there flying south on 23rd November, while on 20th November one passed North Unst going north-east.

Bewick's Swan, *Cygnus bewickii bewickii*.—Twenty-six Bewick's Swans were seen on Bishop Loch (Gartcosh) on 5th March, fifteen on Possil Marsh on 12th March (*2*. viii. 58), and two at Swona on 24th December.

The Grey-lag Goose, *Anser anser*.—About three hundred Grey-lags were seen in Wigtown Bay on 3rd April, a flock of a hundred going north-west at the same place on 24th April, a large flock going north at Dundee on 28th April, and "large lots of Grey Geese" passing north at the Beauly Firth from 9 A.M. to 7.30 P.M. on 30th April.

A Grey-lag Goose was seen on the mudflats of the Cromarty Firth on 10th July, seven "Grey Geese" at Tentsmuir on 15th September, several "Geese" at Cambo, and one at North Ronaldshay on 28th September, and a good many Grey-lags in Wigtown Bay on 1st October. After this and up to 21st November we have many records of "Geese" or "Grey Geese" going south, but the species to which they belonged is not stated.

The White-fronted Goose, *Anser albifrons*.—Twelve are recorded from North Ronaldshay on 7th November, and a dozen on a small loch at Aultbea (Ross-shire) on 10th December.

The Bean Goose, *Anser fabalis fabalis*.—Five are reported from Darsnag Flow, Corsemalzie, on 7th November.

The Pink-footed Goose, *Anser brachyrhynchus*.—There were "enormous numbers everywhere" about Randerston (near Kingsbarns) on 4th and 5th November, and a flock of about two hundred on Hule Moss on 3rd December.

The Barnacle Goose, *Branta leucopsis*.—On 17th May eleven were seen at the Monachs going north. About twenty Barnacle Geese were seen flying over the Old Bar at Elgin on 29th September, a flock flying south-east at Vallay, N. Uist, on 2nd October, and some passing Barra Head on 16th October.

The Brent Goose, *Branta bernicla bernicla*.—Two were seen going north-east at Lingo (Fife) on 8th March, and a flock of thirty to forty at Guardbridge (near St Andrews) on 29th March, about twenty there on 1st and five on 6th April. On 4th October a flock of fifteen was seen flying south-east at Vallay (N. Uist), about thirty on the Dornoch Firth, and six off Kingsbarns on 19th October, one at North Ronaldshay on 18th November, eight there on 21st November, and eight at St Ninian's Bay, Bute, on 22nd December (1. 1917, 99).

The Sheldrake, *Tadorna tadorna*.—About two hundred Sheldrake were seen in Wigtown Bay on 21st February, and the arrival of very small numbers is noted from Sule Skerry on 26th February, Holy Island on 30th March, and Little Ross on 8th May. One or a pair are reported from the Kelvin Valley frequently between 20th May and 19th June, while on 11th October five visited Little Ross.

The Mallard, *Anas platyrhyncha platyrhyncha*.—Arrived at Nevay Park on 29th February, a pair at Holy Island (Arran) on 18th March, two at Swona on 20th March, and some on Possil Marsh on 26th March (2. viii. 59). Large arrivals are recorded from 16th September to 5th November from east coast and island stations.

The Gadwall, *Anas strepera*.—A male on Soulseat Loch (Inch) on 10th August, and see p. 150.

The Teal, *Anas crecca crecca*.—Four are reported at Galson (O.H.) on 17th February, some at Possil Marsh on 26th March (2. viii. 59), and large numbers at Summerston on 28th March. On 2nd September one was seen in Largo Bay, enormous numbers at Tentsmuir (where there was much standing water) on 5th September, one at Galson (O.H.) on 10th and 13th October, and five in the sea near Kingsbarns on 11th October.

The Wigeon, *Anas penelope*.—"Crowds" arrived on Lindores Loch (N. Fife) on 17th January, quite a thousand were seen in Wigtown Bay on 21st February, and a good deal of movement is recorded throughout March. One visited the Isle of May on 7th May, and from two to four are reported frequently from the Kelvin Valley between 10th and 20th May. By 20th June a good many males had come down to the Cromarty Firth, and a Wigeon was seen in the Tay near Dundee on 8th July, and a flock of twenty-seven at Luce Sands on 11th August. On 19th September

four are reported from North Ronaldshay, and many, "mostly males," had returned to Summerston Loch. The first arrivals seen at Vallay (N. Uist) were on 21st September; a small flock is noted at St Andrews on 30th September, eight on Castle Lake, Duns, on 7th October, and many arrivals in the sea off Kingsbarns on 19th October, while on 31st December about a hundred and fifty were seen on the flooded haughs of the Kelvin at Summerston.

The Pintail, *Anas acuta*.—"Quite a hundred" were seen in Wigtown Bay on 21st February, and seven there on 17th April, while a male and two females are noted near Summerston on 16th May (2. viii. 36); it is "uncommon in Clyde." A fine drake was seen on Tentsmuir on 5th September; first seen North Ronaldshay on 17th September, and many there from 22nd to 30th September, a good many on the Beauly Firth on 16th October, and thirty to forty in Wigtown Bay on 17th November.

The Shoveller, *Spatula clypeata*.—Five were on Bishop Loch on 5th March, and a pair visited Redmyre Loch on 10th April but did not remain. On 30th April, 26th and 27th May, 5th June and 3rd September, one or two Shoveller were seen in the Kelvin Valley (2. viii. 35), twenty arrived at North Ronaldshay on 4th September, and there were many there on 22nd September, a pair on Castle Lake, Duns, on 7th October, while a flock of about twenty are reported from Redmyre Loch on 21st October.

The Pochard, *Nyroca ferina ferina*.—About a thousand are reported from Bishop Loch (Gartcosh) on 5th March, and about twenty pairs on Bardowie Loch on 19th March. A flock of about forty on Castle Loch, Mochrum, on 13th September, eighteen on Castle Lake, Duns, on 7th October, three at North Ronaldshay on 25th October, and twelve in the Kelvin Valley on 28th October, while on 7th December large flocks are noted at North Ronaldshay.

The Tufted Duck, *Nyroca fuligula*.—Many are recorded from Possil Marsh on 26th March, but only two drakes and a duck were there on 27th April (2. viii. 59 and 61). On 21st June a flock of twenty were on Mochrum Loch, seven at Little Ross on 25th October, about a dozen in the Tay near Dundee on 18th November, and four at North Ronaldshay on 23rd November.

The Scaup, *Nyroca marila marila*.—A flock of fifty were seen at the mouth of the river Luce on 17th February, a female on Possil Marsh on 27th April, the first ever seen there (2. viii. 61),

and a male in the Tay Estuary on 14th May. On 13th October two are recorded near Kingsbarns, a female on the Kelvin on 12th November, and a Scaup on a small loch near the sea at Aultbea (Ross-shire) on 18th November.

The Goldeneye, *Bucephala clangula clangula.*—Last seen Tay Estuary 30th April, a male at Castle Loch, Mochrum, on 19th May, and a pair again spent the summer at Soulseat Loch (Inch). Arrivals in autumn are recorded from the Beauly Firth on 5th September, Sule Skerry on 26th September, and Kingsbarns on 14th October, and further notes of arrival come up to mid-November.

The Long-tailed Duck, *Clangula hyemalis.*—Is recorded regularly up to 29th March, after which the only note is of six "well into summer plumage" near Kingsbarns on 24th April First seen in autumn off Kingsbarns on 9th October, Swona on 18th October, and about a dozen in the Dornoch Firth on 16th November.

The Eider, *Somateria mollissima mollissima.*—A drake and two ducks were seen at Luce Sands on 17th February, and many arrived at the Isle of May on 1st April. On 19th September there were great numbers all day at North Ronaldshay, and several drakes returned to the Isle of May on 17th October.

The Black Scoter, *Oidemia nigra nigra.*—Enormous and very restless flocks were seen off Kingsbarns on 24th April and a bunch in the Dornoch Firth on 13th June, and on 29th June adult and young birds were seen in the sea off Wick. Many Black Scoter stayed all summer in Largo Bay, and there were a lot in the Dornoch Firth on 13th July.

The Velvet Scoter, *Oidemia fusca fusca.*—Many very restless Velvet Scoter were seen off Kingsbarns on 24th April, a good many in Largo Bay on 23rd June, and three adults off shore near Wick on 29th June. One in Largo Bay on 13th July and six in the Dornoch Firth on 16th August.

The Goosander, *Mergus merganser merganser.*—A pair were seen in Luce Bay on 17th January, and from Durris on 14th March comes this note, "large numbers during the snowstorm which has continued for a fortnight past," while a pair were seen on the Whitadder on 18th March. Three are noted near Dundee on 28th October,

and a flock of about twenty on the Tay Estuary next day, one in Largo Bay on 7th December, and a female was shot on the Leader, two miles below Lauder, on 19th December.

The Merganser, *Mergus serrator*.—Five are recorded at North Unst on 8th April, last seen Tay Estuary on 22nd April, and one close in at Sinniness (Luce Bay) on 20th May. One in Largo Bay on 13th July, and "a party" in the Tay Estuary on 29th October.

The Smew, *Mergus albellus*.—See p. 150.

The Shag, *Phalacrocorax graculus graculus*.—On 10th February the Shags returned to their breeding-place on the Isle of May, and on 3rd October one was seen on a loch four miles from the sea at Galson (O.H.).

The Gannet, *Sula bassana*.—Gannets are reported at the Monachs and Whalsay Skerries on 17th January, at the Isle of May on 27th January, and more there on 10th February, while during March many notes come of these birds. A Gannet was seen on an inland water, seven miles from the sea, in Renfrewshire, on 6th September. There were great numbers off N. Ronaldshay from 22nd to 30th September, and also off Kingsbarns on 10th October; three young birds were seen in Largo Bay on 22nd October, and a number about the Isle of May on 4th November.

The Storm Petrel, *Hydrobates pelagicus*.—Single birds are reported from the Isle of May on 5th June, Vallay (N. Uist) on 15th September, and the Little Ross lantern on 21st November.

The Manx Shearwater, *Puffinus puffinus puffinus*.—Single birds are noted at the Monach lantern at 10 P.M. on 23rd April and the Rhinns of Islay lantern at 11 P.M. on 3rd May.

The Fulmar, *Fulmarus glacialis glacialis*.—Three are reported at Whalsay Skerries on 23rd January and 11th March, and a few from the Butt of Lewis on 3rd and 4th March. Throughout April we have notes of small numbers from Lerwick, Butt of Lewis, Whalsay Skerries, and Swona, two at the Monachs on 1st June, and some at Lerwick on 11th June and 6th July, while on 8th November large flocks returned to North Unst.

The Great Crested Grebe, *Podiceps cristatus cristatus*.—One was seen in Largo Bay on 4th February; the species was on Bardowie Loch on 4th March, a pair in the Tay Estuary from 21st April to 13th May, and two pairs there on 14th May. Two adults

and one immature bird were on Mochrum Loch on 6th October, and two in winter plumage on the Dornoch Firth on 19th October.

The Slavonian Grebe, *Podiceps auritus.* — About a dozen were seen at Aultbea, Ross-shire, on 4th November.

The Red-necked Grebe, *Podiceps griseigena griseigena.*— See p. 150.

The Little Grebe, *Podiceps ruficollis ruficollis.*—One arrived at Castle Lake, Duns, on 30th January, and a pair at Possil Marsh on 6th February (2. viii. 58).

The Great Northern Diver, *Colymbus immer.*—Is recorded pretty steadily up to mid-April; last seen Kingsbarns 24th April, Holy Island 2nd May, and Luce Bay 20th May.

The Black-throated Diver, *Colymbus arcticus.*—A pair arrived at their breeding loch in West Inverness on 5th April; on 23rd September an adult in breeding dress and two young birds were seen in Largo Bay, and several near Kingsbarns on 7th and 8th October.

The Red-throated Diver, *Colymbus stellatus.*—On 29th June several adult and immature birds were seen off-shore near Wick, two at Kyleakin on 3rd September, and two in Lunan Bay on 18th September.

The Wood-pigeon, *Columba palumbus palumbus.* — Great numbers were seen about Durris (Kincardineshire) during the snow-storm in the first half of March; one or two Wood-pigeons are reported from the Isle of May on 21st and 22nd March, 2nd April, 10th and 21st May, and from Fair Isle on 20th, 21st and 24th April, while a flock of about two hundred and fifty were seen near Old Luce on 20th May, and a flock near Largo on 11th July. Single birds are reported from the Isle of May on 9th July and Galson (O.H.) on 16th July, a flock of eighteen from the former station on 26th September, and "many thousands" at Craigdhu, Glasserton, on 23rd November. A movement from E. to W. was noted at Cullen, Banffshire, on 20th December.

The Stock-dove, *Columba œnas.*—A flock of about a hundred and fifty is recorded from Barsalloch (Wigtownshire) on 21st February, about twenty on Duns Law on 12th March; two went over Largo to the N.E. on 28th April, and a flock of thirty in a field near Old Luce on 20th May. Three or four were seen near Cullen

on 28th November, and a flock of about sixty near Lauder on 15th December.

The Turtle-dove, *Streptopelia turtur turtur*.—A female was shot at Balhomie, near Meikleour, on 25th May, and a Turtle-dove was seen on Raasay on 29th June (1. 1916, 269).

The Oystercatcher, *Hæmatopus ostralegus ostralegus*.—On 4th February several Oystercatchers returned to the Butt of Lewis "earlier than usual"; on the 6th they first appeared on the Dee, and on 13th February they were going over Largo at 11 P.M. From 26th February to 2nd April we have many notes of return from stations in the Northern Isles and Outer Hebrides, and from 12th March from inland breeding-places. On 2nd April one was seen five miles inland, near Kilmacolm, and on 4th April a flock of thirty were seen in a manured field two and a half miles inland at Castle Kennedy. On 6th May one struck the Rhinns of Islay lantern at 9 P.M., a flock of seventeen were seen at Torrs Sandhills (Wigtownshire) on 18th May, and one of fourteen in Largo Bay on 29th May. Four Oystercatchers were noted at Crosswood Reservoir on 6th July, five at the Bell Rock on 15th August, and many arrivals in Largo Bay on 31st August, these being probably movements of our own breeding birds. One on Whalsay Skerries on 22nd October, great numbers at the Little Ross lantern at 1 A.M. on 3rd December, one at Kyleakin on 7th December, and four on Whalsay Skerries on 17th December "apparently wintering."

The Ringed Plover, *Charadrius hiaticula*.—One to three Ringed Plover are recorded in the Kelvin Valley from 19th to 21st May and on 9th June. Arrivals are reported from Largo Bay on 6th August, one at the Little Ross lantern on 7th September, and numerous at that light at 1 A.M. on 22nd September and from 8 P.M. onwards on 2/3rd October, while one struck the Rhinns of Islay lantern at 10 P.M. on 30th September. Hundreds arrived on North Ronaldshay on 7th October, flocks are recorded at Lerwick on 22nd October and 26th November, and numbers at the Little Ross lantern on 14/15th November, while one was seen at Summerston (Kelvin Valley) on 14th December, an interesting date for an inland occurrence.

The Golden Plover, *Charadrius apricarius*.—A dozen Golden Plover were at the Killantringan lantern at 1 A.M. on 6th January, and a few at the Little Ross lantern at 7 P.M. on 27th January. Returns to inland breeding-places are noted from 2nd

February to 22nd March, and numbers of birds on passage in the Kelvin Valley on 9th and 24th April. A few are reported from Fair Isle between 18th and 25th April, a flock of about a hundred "showing very little black on the breast" near Corsemalzie on 27th April, a flock at the Monachs on 29th April, three at the Rhinns of Islay lantern at 9 P.M. on 6th May, and some at Lerwick on 24th May.

By 21st July forty to fifty old and young birds had returned to the shore at the Cromarty Firth, and by 6th August one had reached Largo Bay. From this time up to 11th October we have many notes of movements of Golden Plover from stations in Southern Scotland; these were no doubt largely our breeding birds on the move, but immigrants from overseas may also have been present. A Golden Plover was seen on Swona on 19th October, great flocks at Summerston on 11th November; a large flock at Pladda from 13th to 20th November, a few at the Rhinns of Islay lantern at 11 P.M. on 18th November, and many at the Little Ross lantern on 2/3rd December. A weather movement is recorded from this last station, Cullen, and the Rhinns of Islay from 18th to 20th December.

THE GREY PLOVER, *Squatarola squatarola*.—One is reported from the Monachs on 1st February, and three at Luce Sands on 17th February. Two or three Grey Plover were seen at the Beauly Firth on 25th September, one near Kingsbarns on 17th October, and seven in Wigtown Bay on 17th November.

THE LAPWING, *Vanellus vanellus*.—A few Lapwings were at the Little Ross lantern at 7 P.M. on 27th January, some were at Fair Isle on 31st January, and one was killed at the Killantringan lantern at 9 P.M. on 3rd February. Returns to inland breeding-places and notes from our southern lanterns and island stations come steadily from 4th February to 26th March, these being evidently our own birds returning. From 16th to 24th March records of Lapwings come from the Northern Isles; these *may* have been passage migrants. Some Lapwings visited the Isle of May on 3rd April, and one was there on 2nd May. Flocks of twenty-three were seen at Torrs Sandhills on 18th May, of seventeen in Luce Bay on 11th June, and of sixty near Mochrum on 15th June. During July much flocking and returns to the shore after breeding are recorded, while from 22nd September to 1st November much movement is reported from our southern stations (Little Ross (L.), Pladda (L.), Rhinns of Islay (L.), and Isle of May). On 4th October Lapwings

arrived at Barra Head, and on 20th October and 4th November at Swona, an enormous flock at Kilmacolm on 13th November, and that night "uncountable numbers" were at the Little Ross lantern, many there on 14/15th November and 2/3rd December, a few at the Rhinns of Islay lantern on 14th and 18th November, and at Pladda lantern on the last date. A weather movement is noted from Cullen, Rhinns of Islay, Little Ross, and Pladda from 16th to 19th December; at this last station a large flock was seen at 3 P.M. on the 19th "going W.S.W. in the direction of Ireland." Such a large proportion of the above autumn notes come from stations in S.W. Scotland that it is probable that the records refer in great measure to birds *en route* for the Emerald Isle.

The Turnstone, *Arenaria interpres interpres*.—Last seen Port William on 21st May and Gillespie (Luce Bay) on 18th June. On 17th July about a dozen, "some in rich summer plumage, others with much less," were seen at Tarbatness; on 30th July several were at Galson (O.H.), and a few at Swona next day. Throughout August and September arrivals are recorded from various localities; a large arrival took place at North Ronaldshay on 20th October, and a Turnstone was killed at the Little Ross lantern at 8 P.M. on 27th October.

The Ruff, *Machetes pugnax*.—From one to five are recorded at Summerston (Kelvin Valley) from 1st to 12th September.

The Sanderling, *Calidris alba*.—Flocks are noted on Luce Sands on 18th May. On 25th July about thirty old and young birds are reported from the Dornoch Firth, several in Largo Bay on 2nd August, a great many at Lossiemouth on 13th September, and some at the Little Ross lantern on 13/14th November.

The Knot, *Erolia canutus*.—A flock of a hundred and fifty is reported from Wigtown Bay on 21st February; last seen Whalsay Skerries on 28th April. Returned to Whalsay Skerries on 29th July, Largo Bay on 31st August, and North Ronaldshay on 17th September, while on 2/3rd October Knots were numerous at the Little Ross lantern and again at 1 A.M. on 3rd December.

The Dunlin, *Erolia alpina alpina*.—From 9th April to 19th June small numbers of Dunlin are recorded from Summerston (Kelvin Valley); from 29th April to 12th May notes of movement come from the Northern Isles and Outer Hebrides, while on 8th May one was at the Little Ross lantern at 1 A.M. One or two flocks on Luce Sands on 18th June, a Dunlin at the Isle of May

on 10th July, a small flock at Galson (O.H.) on 22nd July, and arrivals in Largo Bay on 6th August. A good many are reported from Summerston on several dates between 29th October and 15th December.

The Curlew Sandpiper, *Erolia ferruginea*.—Single birds are recorded from Largo Bay on 31st August, and Maidens, Ayr, on 9th September, and two in Invergowrie Bay on 23rd September.

The Purple Sandpiper, *Erolia maritima maritima*.—An arrival is reported from the Isle of May on 6th August.

The Common Sandpiper, *Tringa hypoleuca*.—Is first recorded from the river Cart, Clarkston, on 16th April, Kilmacolm on 18th, New Galloway and the Kelvin Valley on 19th, and Corsemalzie on 21st April. After this there are many notes of the arrival of our breeding birds up to 27th April, when most seem to have been present. By 17th July many Common Sandpiper were along the shore at Tarbatness "evidently on the move," and notes of movement come steadily throughout August. Last seen Burntisland and Cromarty Firth on 28th August, Loch Elrig (Mochrum) on 2nd September, and Loch Rannoch on 29th September.

The Green Sandpiper, *Tringa ochropus*.—See p. 151.

The Redshank, *Tringa totanus*.—Returns to inland breeding-places are recorded from 1st March to 1st April, and one or two were at the Rhinns of Islay lantern on 6th and 25th April. Throughout July and August returns to the shore after nesting are reported; on 31st August many immigrants arrived in Largo Bay, a Redshank was killed at the Rhinns of Islay lantern at 2 A.M. on 30th October, and many were at the Little Ross lantern all night on 13/14th November.

The Dusky Redshank, *Tringa erythropus*.—See p. 151.

The Greenshank, *Tringa nebularia*.—A Greenshank is reported from Summerston (Kelvin Valley) on 25th March. On 21st July four had returned to the Cromarty Firth, one was at Morton Loch (N. Fife) on 5th August, and three or four on Luce Sands on 11th August. Two or three are recorded from Swona from 19th to 30th August, one in Largo Bay on 31st August, and one at Summerston on 6th and 8th September.

The Red-necked Phalarope, *Phalaropus lobatus*.—This species was last seen at one of its breeding-places on 12th September.

The Bar-tailed Godwit, *Limosa lapponica lapponica*.—Nine were seen in the Tay Estuary on 7th May, one on Luce Sands on 18th May "changing to summer plumage," and a few at the Cromarty Firth on 24th May and 20th June. On 9th July a Bar-tailed Godwit "in winter plumage with several primaries missing in each wing" is reported from Largo Bay, a flock of thirty-seven on Luce Sands on 11th August, "a lot, some in breeding plumage" at the Dornoch Firth on 21st September, and "thousands" there on 16th November.

The Black-tailed Godwit, *Limosa limosa*.—See p. 151.

The Curlew, *Numenius arquata arquata*.—On 6th January a score were at the Killantringan lantern at 1 A.M.; an arrival is noted at Fair Isle on 27th January, and numbers at the Little Ross lantern early on 1st February. From 4th February to the end of March returns to upland breeding-places are noted, and Curlew were plentiful at the Little Ross and Rhinns of Islay lanterns on 6/7th April. On 25th April at 1 A.M. they again visited the latter lantern, and on 24th May a great many were in the rays of the Little Ross lantern at 11 P.M. By 28th June returns to the shore after nesting were noticed at Darvel, and after this further movements to the coast are recorded. Very numerous at the Little Ross lantern at 1 A.M. on 30th August, large flocks on Barra Head from 1st to 23rd October, and "uncountable numbers" at the Little Ross lantern all night on 13/14th and 14/15th November and 2/3rd December.

The Whimbrel, *Numenius phæopus phæopus*.—Whimbrels are recorded from North Unst on 10th April, Little Ross on 23rd and Luce Sands on 25th April. After this there are a good many notes of this species from various localities up to 16th May. One was seen at Castle Loch, Mochrum, on 19th May, many in the rays of the Little Ross lantern at 11 P.M. on 24th May, and one at Soulseat Loch (Wigtownshire) on 10th June. Autumn movement is reported from Galson (O.H.) and Dunbar on 18th July, Swona on 29th July, Largo Bay on 2nd August, and Nevay Park on 7th August. Last seen Tentsmuir on 5th September and Galson on 21st October.

The Snipe, *Gallinago gallinago gallinago*.—A few Snipe were on Sule Skerry all February, four on Holy Island on 29th March, three were killed at the Little Ross lantern at midnight on 6th April, and a few are noted on Fair Isle from 19th to 21st April. On 24th April several were at the Little Ross lantern at 1 A.M., and a pair arrived at the Corrour gardens, while on 27th April one was

on Swona. The first note of autumn movement comes from the Isle of May on 1st August, and great numbers of Snipe are recorded from Summerston on 21st August and 1st and 2nd September. From 22nd September to 21st October a considerable immigration is reported, these being doubtless travellers from overseas.

The Jack Snipe, *Limnocryptes gallinula*.—Last seen at Corsemalzie on 1st March, and the first autumn note comes from the same place on 8th September, followed by Morton Loch (N. Fife) on 22nd September, the Rhinns of Islay lantern at 3 A.M. on 28th September, and Vallay (N. Uist) next day; from this last station comes the note, "Foreign Snipe are very late this year." After this many arrivals are reported up to 28th October from many localities, both inland and coastal.

The Woodcock, *Scolopax rusticola*.—Small movements are noted from our island stations from 5th March to 2nd April, and a few Woodcock were on Fair Isle from 19th to 21st April. From 23rd September to 17th November a considerable movement is noted from our island stations and lanterns, chiefly in the Northern Isles, and this was evidently an immigration from overseas. From 22nd to 28th December a distinct movement is recorded, probably due to weather influences.

The Black Tern, *Hydrochelidon nigra nigra*.—See p. 151.

The Sandwich Tern, *Sterna sandvicensis sandvicensis*.—Is first recorded from Luce Sands on 21st April, near Kingsbarns (Fife) on 24th April, and Largo Bay on 2nd May. Great numbers were seen in Largo Bay on 31st August, but many had left by 2nd September. Last seen Luce Sands on 6th September, Lunan Bay on 18th September, Nairn on 29th September, and Kingsbarns on 11th October.

The Common Tern, *Sterna hirundo*.—The earliest records come from near Kingsbarns on 24th April and the Tay Estuary two days later, and after this there are many records of arrival up to 20th May. On 31st August "enormous numbers, more than ever seen before," appeared in Largo Bay, but most had left by 2nd September and the last seen there was on 9th September, while on 18th September many are reported from Lunan Bay, and on 22nd September "Terns," probably this species, were numerous at Little Ross lantern at 1 A.M.

The Arctic Tern, *Sterna paradisæa*.—One appeared at Swona on 13th May, and two days later about sixty had arrived there.

First seen Whalsay Skerries on 21st and Lerwick on 23rd May, and arrivals are reported from these stations up to 27th May. By 15th August departures are recorded from Sule Skerry, and all had left there by 18th and Whalsay Skerries by 20th August. Last seen Swona on 4th September and North Ronaldshay two days later.

The Little Tern, *Sterna albifrons albifrons*.—Three or four are recorded from Luce Bay on 20th May, one near Dundee on 8th July, and a few near Arbroath on 28th August.

The Little Gull, *Larus minutus*.—See p. 151.

The Black-headed Gull, *Larus ridibundus*.—Arrived at its nesting loch, seven miles from Lauder, on 5th March; great numbers were seen near Largo on 12th March, and arrivals are noted at Corrour on 15th March and Lerwick on 2nd April. On 5th and 13th May this species is recorded from the Isle of May.

By 9th July enormous numbers of old and young birds had returned to Largo Bay, and next day Black-headed and Herring Gulls were thick in the flooded fields between Largo and Edinburgh. On 31st December two appeared on Eilean Mor, one of the Flannans (1. 1917, 34).

The Common Gull, *Larus canus canus*.—An increase was observed on Holy Island on 13th February, arrived to breed at Hellyar Holm on 1st March, and the last party of adults were seen at Dundee on 21st April. On 15th October several were seen within the city boundaries of Glasgow, driven in by a gale.

The Lesser Black-backed Gull, *Larus fuscus*.—On 22nd February one was seen on Luce Sands, and arrivals, doubtless of our *L. f. britannicus*, are recorded from Beith on 15th March and Possil Marsh on 22nd March (2. viii. 59), and thereafter from many stations up to the end of April. On 9th July about a dozen *L. f. britannicus* and one *L. f. fuscus* were seen in Largo Bay (1. 1916, 265), and next day there were a good many of this species in the flooded fields between Largo and Edinburgh. On 9th November a Lesser Black-backed Gull "with a black back," in all probability *L. f. fuscus*, is recorded from Corsemalzie.

The Glaucous Gull, *Larus glaucus*.—Is recorded pretty regularly from our Northern Isles and the Outer Hebrides, up to 6th March. One was seen at Whalsay Skerries on 28th July, two at North Ronaldshay on 16th October, and thereafter there are further records up to the end of the year.

The Iceland Gull, *Larus leucopterus*.—Is noted from our island stations up to 16th March. First seen North Ronaldshay on 15th September, and Whalsay Skerries on 16th October, and thereafter notes come from our Northern Isles up to the end of 1916.

The Kittiwake, *Rissa tridactyla tridactyla*.—Large flocks are reported on the cliffs at North Unst on 15th March, a few at the Isle of May on 19th, and some at Sule Skerry on 24th March. After this visits to the breeding ledges are reported periodically till they settled down there finally about mid-April. A flock were seen at the Isle of May on 28th September, great numbers were passing near Kingsbarns on 10th October, and a bird of the year was seen there on 19th October.

The Ivory Gull, *Pagophila eburnea*.—See p. 151.

The Great Skua, *Stercorarius skua skua*.—Arrived at North Unst on 10th April, and on 17th and 18th July two were seen at Whalsay Skerries.

The Pomatorrhine Skua, *Stercorarius pomarinus*.—One was found lying dead on the seashore on 5th August, near Galson (O.H.).

The Arctic Skua, *Stercorarius parasiticus*.—Arrived at North Unst on 28th April, and one was seen at the Monachs on 1st May. Last seen North Ronaldshay on 22nd September, Kingsbarns on 10th October, the Bell Rock and the Dornoch Firth on 19th October.

The Razorbill, *Alca torda*.—Numerous at the Isle of May on 10th February, and returns to breeding cliffs are noted from 30th March to 22nd April.

The Guillemot, *Uria troille troille*.—There were numbers of Guillemots on the cliffs of the Isle of May on 26th, 27th, and 31st January and 10th February, three at the Monachs on 4th March, and returns to breeding cliffs are reported from 22nd April to 10th May, late dates for this bird to take up its breeding quarters.

The Black Guillemot, *Uria grylle grylle*.—On 27th February twenty-one Black Guillemots, fifteen in dark and six in light plumage, are reported from Whalsay Skerries, and arrivals took place at the Butt of Lewis on 16th March. First seen off Kingsbarns on 20th October and in the sound off Kyleakin on 23rd November and 8th December.

The Little Auk, *Alle alle*.—Between 14th and 19th January several Little Auks were seen about the Butt of Lewis, and single birds were found dead at Kyleakin on 16th January, on the road near Fraserburgh on 24th, near Killantringan on 29th, and near Tummelbridge (1. 1916, 70) on 30th January, and about a mile inland at Galson on 13th February, while during January one was found near the Bridge of Earn and one at Newtonmore (1. 1916, 70). There are many records of numbers of Little Auks being driven ashore alive and dead between 18th February, when many were seen at Loch Alsh, up to 19th March; this coincided with a long spell of stormy weather from between north and east, and heavy seas were running. Many are reported from St Andrews, the Bell, and Newhaven, and some from Portobello, the Isle of May, and the Beauly and Inverness Firths, while in the west small numbers are noted at Galson (O.H.), the Monachs, and Luce Sands; the inland localities reached included Forgan (N. Fife), Edinburgh, Longformacus, Coldingham and Marchmont (Berwickshire), Glenorchard (Stirlingshire), Bishop Loch (Gartcosh), Clarkston (Busby), and the Glasgow and South-Western Railway line at Barrhead.

In autumn, during heavy south-easterly winds, Little Auks again came ashore; some are noted on the Isle of May on 20th November, one was found dead at Glenorchard that day, a good many were seen flying about in Largo Bay on 21st November, one was found dead at Kinnelhead, 1600 feet above sea-level, on 22nd November, and during that month a Little Auk was seen on Tweed.

The Puffin, *Fratercula arctica grabæ*.—Many Puffins were washed ashore dead at St Andrews between 21st February and 17th March, during the same stormy weather that wrecked the Little Auks. Arrivals at breeding stations are reported from 14th April to 10th May, and departures between 12th and 31st August.

The Corncrake, *Crex crex*.—Was late in arriving in 1916. First records come from New Galloway on 27th April, Lauder and Crumstane next day, Darvel on 29th, and Possil Marsh (2. viii. 60), Dunoon, and Giffnock on 30th April. After this there are many notes of arrival up to 19th May, by which time our breeding birds seem to have been generally distributed. A Corncrake is reported from the Monachs on 18th May. Last heard at Darvel on 2nd August, one on the Bell on 28th September, single birds at the Mull of Galloway lantern on 30th September, at the Rhinns of Islay lantern at 3 A.M. on 1st October, Barra Head on 9th October, Earlston and "a few miles away at Legerwood" (both shot) on 12th October.

The Water-rail, *Rallus aquaticus aquaticus*.—One is recorded from Torrs Sandhills (Wigtownshire) on 2nd January, two at Derrie (Mochrum) on 18th January, and one at Possil Marsh on 27th February (2. viii. 58). On 20th October single birds are recorded on Swona, and at the Little Ross and Rhinns of Islay lanterns that night; at the latter lantern at 10 P.M. on 4th November, and near Cullen on 14th December.

The Moorhen, *Gallinula chloropus chloropus*.—One was seen walking about a garden in Largo, far from any water, on 11th May. On 9th July one is recorded from the Cromarty Lighthouse, and one was killed at the Pladda lantern on 29/30th October.

The Coot, *Fulica atra atra*.—Returned to Possil Marsh during the first week of February, and had increased to "at least thirty" by 6th April (2. viii. 58 and 60).

The Capercaillie, *Tetrao urogallus urogallus*.—A female was seen near Kilmacolm in April (1. 1916, 270), a young male at Langhouse, Inverkip, on 19th August, and three or four hens and another cock at the latter place since then (l.c.).

The Black Grouse, *Lyrurus tetrix britannicus*.—A cock was observed among the willows at Possil Marsh on 12th March, the second ever seen there (2. viii. 59).

The Red Grouse, *Lagopus scoticus*.—A Red Grouse was "seen on the island" at Kyleakin on 13th November.

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(*Authors are responsible for nomenclature used.*)

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SOME NOTES AND OBSERVATIONS ON THE MOLE IN CAPTIVITY.

By FRANCES PITT.

THERE is a generally accepted idea that it is impossible to keep a mole alive for long in captivity, but I am convinced that the sole difficulty lies in the food supply, and that those who have failed have done so only because they did not realise the enormous appetites of these small creatures, so the unfortunate captives have died of starvation. The mole has such a rapid digestion that it cannot go many hours without eating, even a night's fasting being fatal. Two instances have come under my notice. In the first case a workman who knew that I wanted a mole alive and unhurt, found one when turning over some rubbish, caught it before it could dig into the ground, and as it was too late in the day to bring it to me, put it in a box, in which he also put some soil to "make it comfortable-like." Next morning, at six o'clock, the mole was not only lying dead on the top of the earth, but was cold and stiff as well! In the second instance, I gave a captive mole forty worms in the afternoon, and then left it until the following morning, when I found the poor creature was dead. Examination proved the stomach to be perfectly empty, and it became obvious that the little glutton

had gorged itself the previous evening, and had been left without supplies for the night.

Another example of the mole's rapid digestion and liability to starvation was the case of one which I called No. 4. I fed it at 9.30 in the evening with plenty of worms, but at 7.15 the following morning I found it looking very miserable and hunting weakly for food. It was cold as well as feeble, and I did not think it would recover; however, it ate the worms I gave it in a ravenous manner. When it had eaten some it seemed a little better, and then began to make up its bed. In a few hours it was all right and quite itself, but I am convinced that it was only fed just in time, and that in another half hour it would have been dead.

The first mole I had, which was known as No. 1, I kept for a month, and then released in as perfect condition as when it was caught. It had a daily allowance of not less than sixty worms, but sometimes had many more. The worms were doled out to it three times a day for fear it should eat them all at once. The average weight of worms consumed in the twenty-four hours was 4 oz., which was more than the animal's own weight, for it was but 3 oz. At this rate it ate 7 lb. 8 oz. of worms in the thirty days, and had I kept it for twelve months would have required 90 lb., which would mean 21,600 worms. Perhaps the reader will now have some inkling why I turned this mole out at the end of the month! In considering what moles eat, it should not be forgotten that a captive would hardly have as good an appetite as a free mole, which would have to take considerable exercise in pursuit of its prey. In short, the amount of worms—and worms are undoubtedly their staple food—that moles consume in this country in the course of a year must be something incredible.

In justice to the species, I will add that later on I kept a mole for a considerable time on a daily ration of 3 oz. of worms, but this was simply because I had such difficulty in getting it any more. It was always ready to eat as many extra as I cared to provide.

The first-mentioned mole, which I will speak of as No. 1,

was kept in a tub, wherein she (from its small size I think it was a female) could dig and delve in 18 ins. of soil. This was really too much, as she was seldom visible, and I could not watch her as I should have liked to have done. She had been caught in rather a curious way, being taken on the surface in a trap set for a stoat. The man who had set the trap was still near when it went off, he heard the snap, went back, and found the mole caught by a paw. By a lucky coincidence I was at hand, and had soon released the captive and popped her into my glove, where she scratched and struggled, and squeaked loudly all the way home. It was a curious sound, something like the squeak of a shrew, but not quite so shrill.

Put in her new quarters, the mole dashed frantically round and round, tried repeatedly to climb out, and then buried herself, when I judged that from the heaving of the soil she must be exploring the bottom of the tub. I was surprised to see as she went down into the earth that she scratched the soil out with her hind feet just as a dog or a rabbit would have done.

I put in some grass and leaves, and by next day she had made a comfortable bed on the top of the gravel. All the moles I have kept since have taken at least two days to get accustomed to their surroundings and make a nest. But she made a comfortable one almost at once, in which I could see her lying, curled up into a ball of dark grey velvet which was warm and soft to the touch. When she felt my finger she squeaked, rolled over on her back, and kicked, then jumped up and ran off down one of the tunnels she had made. After a few days she got accustomed to being poked and no longer squeaked when she felt my finger, but simply pushed her way out of the nest and began to look for worms.

By the end of the week her nest was an elaborate one, with a bolt hole at the bottom, and three tunnels leading to it just below the surface. As she got more at home it became increasingly difficult to see what she did, for she spent her time sleeping in the nest and burrowing in the earth, so when some time later I got another live mole, I determined to keep it in quite a different place so that I

could see exactly what it did. I got a glass-sided cage for mole No. 2, put 2 or 3 ins. of soil in it and a handful of leaves, and then took it into the sitting-room. The new mole, which was a fine one, was then put in. He did not squeak when touched, and indeed was surprisingly fearless. From the first he would take worms from my fingers, and in all respects was so bold as to give me but little respect for his intelligence. The worm supply proving a problem, I gave him small pieces of raw beef and afterwards bits of rabbit liver. He ate a few little bits under pressure of hunger, but it was obvious he did not like such fare. A mole I had later on, known as No. 4, was not so particular, and was greedy over pieces of mutton. Another time I tried No. 2 with a bit of flesh and fat from the neck of a pheasant, which he seemed to like. A chicken's head with feathers on it was attacked with fury. He worried it so savagely that I was able to raise him in the air hanging to the end of the neck. Another, and to me totally unexpected, thing that he ate with relish was cheese! I dropped in some crumbs one day, and to my astonishment, having smelt them over carefully, he chewed them up. It is curious how attractive cheese is to many mammals. It is the best bait for shrews, and I have known tame badgers and a pet pine marten regard it as the greatest of treats. After this I often, when hard pressed for worms, gave the mole bits of cheese, also morsels of bread soaked in milk, but he did not seem to like the latter fare. I further experimented with slices of potato, as I wanted to throw light on the statement of Mr G. Bolam[1] that he had caught moles in ground where potatoes were being grown with their stomachs full of potato-like substance. However, my mole declined such diet, neither potatoes whole nor potatoes sliced tempted him in the least, and I have never found in the stomach of any mole I have examined the least evidence that the animal had been living on vegetarian fare. Fibres are occasionally to be found mixed with the mass of chewed and semi-digested worms that the stomach always contains, and in one instance I found a tightly packed oval pellet of such fibres, 20 millimetres long by 15 wide, that

[1] "Vegetarian Moles," in *Country Life* of 2nd September 1916.

appeared to have been the result of the long-continued accumulation of indigestible bits swallowed when eating worms.

When mole No. 2 was engaged in demolishing a worm he was oblivious to everything else. More than once I lifted him up by his tail, when he went on eating just the same, though the slightest touch when he was not so engaged would have made him spin round. If I dangled a worm in front of him, he would pull and tug at it, hanging on with a bull-dog grip, so that if the worm was strong enough he could be lifted in the air. In dealing with his prey he behaved very like a shrew, grabbing the worm, dropping it, and then biting it from end to end so as to kill it. Though I never saw him shake a worm, he always reminded me of a terrier with a rat. Having quieted his victim, he sometimes began to eat it at once, holding it down with his paws, and chewing from one end, dragging it bit by bit between his hands until all was eaten ; but more often he left it, rushed to a corner of the cage, dug a shallow hole, ran back, picked up the worm, and carried it to the spot. He would remain with his head and shoulders hidden for some seconds, and then come back for another worm. Sometimes, when satisfied, he may have buried superfluous worms, but I feel sure that as a rule he merely took his prey to the hole to keep it from wriggling about and soiling his beautifully kept fur, for I have seen other moles behave in exactly the same way even when very hungry. That this mole did not like a worm to squirm over him was obvious, and he would drop one hastily that did so. I never saw him lick his fur, but he was constantly scratching it with his hind feet. They were also used to comb dirt off the forepaws.

It is sometimes said that moles are very thirsty animals, and never found far from water, but my captives have shown no desire to drink. No. 2 did dip his nose several times into the water tin, but on each occasion went off sneezing and snorting as if he did not like it. I believe the association of moles with damp land is really due to the greater numbers of worms that are to be found in such spots.

The day after this mole (No. 2) was captured he began to make a bed by drawing around him the leaves I had provided, and as time went on this nest grew bigger and bigger until he had gathered quite a pile of leaves. Sometimes when hungry he would upset his bed in his frantic rushes about the cage, but as soon as he had fed he would rearrange it nicely. I watched him one evening when he was busy at the task. He sat in the middle of the nest, from which he stretched out and pulled in all the leaves he could reach. First his pink nose appeared here and then there, and each time a leaf rustled on to the heap. As far as I could see he did not use his hands at all, but depended entirely on his mouth in gathering and arranging the stuff. Sometimes he fetched material from the opposite end of the cage, but he evidently preferred to sit in his nest and pull to him the leaves that were near.

All my moles preferred leaves to grass for bed-making. When both were supplied, the leaves were taken first and the grass last, but even the latter was eventually used up. In a wild state this preference is no less marked, for an examination of the nest contained in each fortress will show that in the majority of cases the bed is made of leaves, which in some instances must have been carried quite a long way.

When the mole had placed them to his satisfaction and was well covered, he curled himself up into a ball and went to sleep. He then felt like a ball of warm silky velvet, but like the former and subsequent moles, he resented being touched, and would remonstrate with an energetic kick, but never attempted to bite. He slept soundly, and often made a curious grunting squeak, which I concluded was a form of snoring. He was easily alarmed by noise, and any loud unaccustomed sound would send him underground. Yet he soon learnt to associate knocking on the glass, my voice, and the rattling of the worm tin with food. The minute he heard any of these sounds he came scuttling out of his nest to see what he could get. If not disturbed he came out for food and exercise

at intervals of from two to three hours, but a mole I had afterwards slept for three and four hours at a time. No mole I have watched has appeared to be more active or the reverse at night, but naturally the dark would have no significance for an animal that must be practically blind. I was anxious to find out if a mole's eyes are any use to it (for these minute organs are perfect in structure), but failed to secure any positive evidence one way or the other. Mole No. 1 usually disappeared into the soil when I went near her tub, and I thought it was because she was alarmed when I leant over the edge and cut off the light, but it may have been the vibration of my footsteps which frightened her. Possibly moles do know the difference between light and darkness, but I think it is doubtful if they "see" anything in our sense of the word.

(*To be continued.*)

An enormous Bitch Otter.—In my article in *The Annals of Scottish Natural History* on "The Length and Weight of Otters" (July 1909, pp. 134-9), I gave the average weight for a bitch otter as from 14 to 16½ lbs. Bell in his *British Quadrupeds* gave the weight of the bitch otter as from 16 to 20 lbs., Daniel in his *Rural Sports*, 13 to 22 lbs., whilst the heaviest bitch mentioned in Millais' *British Mammals* is 16 lbs.

In *The Annals of Scottish Natural History* for March 1910, in some additions, I mentioned a bitch killed by the Crowhurst Otter Hounds in September 1908, which weighed 22 lbs., with a total length of 45½ ins., this being the largest bitch otter on record! (Since writing, I have another record of a 22-pounder bitch.) I can now record a bitch which puts the two last-mentioned records altogether into the shade. In March 1913 a bitch was trapped near Levens Hall, Westmorland, which weighed the enormous weight of 27¾ lbs., with a total length from tip of mask to point of rudder of 54 ins. She was, moreover, weighed with a dry jacket and was not in cub, but apparently a barren specimen. There is no doubt as to the sex, although her length and weight were those of a very large dog otter.—H. W. Robinson, Lancaster.

Little Bittern in Shetland.—On the evening of 29th May a Little Bittern (*Ixobrychus minutus*) was captured alive at Burrafirth, Unst. It was being mobbed by Herring Gulls, and had been very severely punished. I forwarded the bird to Dr Eagle Clarke for the Royal Scottish Museum, where the specimen proved to be a welcome addition to the collections, which did not contain a Scottish example of this species. Dr Eagle Clarke informs me that the bird is an adult female, and, so far as he is aware, the third recorded visit of this Central and Southern European breeding bird to the Shetlands.—T. Edmondston Saxby, Halligarth, Unst.

Rare Birds in Berwickshire. — On the 8th April last an example of the Purple Heron (*Ardea purpurea*), a rare casual visitant to Scotland, was observed within a short distance of the town of Duns. My attention was called to the bird by two men who had noticed it standing among some withered rushes on the bank of the lade near Duns mill, and they wished to know to what species the dark-coloured Heron belonged. As I was quite familiar with the appearance of the Purple Heron—having seen many of them in the marshes of the Camargue—I had no difficulty with the identification. By making a detour through a field we were enabled to get within twenty yards of the bird before it flew, and so obtained an excellent view of it. Although the bird was looked for on several subsequent occasions, it was not seen again.—When walking through Duns public park on the 28th May, a note somewhat like the "tick" of the Garden Warbler, but not quite so loud, arrested my attention, and I suspected a Lesser Whitethroat (*Sylvia curruca*). Standing quietly by for a few minutes I got glimpses of the bird in the thicket, and at last got a clear view of it, when the smoky grey head and dark earcoverts at once confirmed my suspicions. It continued hunting insects for some time, and confined its search to the tangle of bushes where it was first heard. Since then the monotonous song has frequently been heard near the same spot, from which it would appear to be nesting, although, so far, the nest has not been found.—T. G. Laidlaw, Duns.

Hawfinch in Linlithgowshire.—In May last I had handed to me an adult male Hawfinch which was found dead in Dalmeny Park, West Lothian, on or about the 12th of the month. The spot where it was picked up is about a mile east of the locality where the nestling I recorded in this magazine was got in May 1911.—Bruce Campbell, Edinburgh.

BRENT GEESE IN SCOTLAND.

By J. G. Millais, Lieut.-Commander, R.N.V.R., F.Z.S., etc.

I CONSIDER that Misses Rintoul and Baxter are right in calling attention to the "two forms of Brent Geese" which visit Scotland in the winter, because the distribution of the light and dark forms are far more marked than they are in England.

Having pursued wild-fowling and natural history for the past forty years on the coast and islands of Scotland, where I have visited, sometimes frequently, every resort of wild-fowl, I can speak with some experience of the distribution and colour differences of the Brent Goose.

My friend, Mr Abel Chapman, doubtless knows the Geese of his own coasts, *i.e.*, the north of England, intimately, but does he know the Geese that are resident or migratory in Scotland! I think not, or he would not confine himself to so strong a statement as "every wild-fowler who has enjoyed personal acquaintance with Brent Geese in Great Britain (as I have done for forty odd years) speedily learns the elementary fact that in every big pack of these Geese, whether on British or Irish coasts, there are found associated together individuals that display every grade of colour. There are many whose breast plumage is as dark as their backs; others are almost white beneath; whilst every intermediate gradation of tone is in evidence." Doubtless Mr Chapman is correct if this statement applies to English or Irish packs of Brent Geese; and judging by what I have seen on our eastern coasts of England, and of the birds that come to our London markets, it is correct, but it is very wide of the mark when we come to examine the colour of the Scottish birds and their distribution. Briefly, my experience is as follows:—

In Shetland occasional flocks occur on migration, but it is not resident in winter. In Orkney it is a rare visitor to Deer Sound and Sanday. I have only seen one in twelve years' shooting there, and that was a dark-breasted bird.

All along the west coast of Scotland as far as the Solway the Brent Goose only passes on migration, though a few may remain for a short time in the estuary of the Clyde or Solway banks. On the east coast of Scotland a few sometimes spend a short time on the Little Ferry. The first regular winter resort is the Dornoch Firth, where they are by no means abundant, and found on the south shore west of Tain. Here I have killed a few, and seen many shot by the professional gunners. They were all white-breasted birds.

The main resort of Brent Geese in Scotland in the winter are the Cromarty and Moray Firths (in the latter west of Fort George). I have here killed a large number myself, and seen many killed by the professional gunners. They were *invariably* only white-breasted birds. I don't remember ever to have seen an "intermediate" specimen, and never once a dark slate-grey specimen. A few go up the Beauly Firth at night, but these waters are too narrow and dangerous for such shy fowl.

Coming south we find no grounds suitable to Brent Geese until we reach the Tay estuary. Here I have killed them as early as 28th August, and frequently in winter, but their numbers are always few. All of those I have seen there were dark-breasted slate-grey birds with an occasional intermediate specimen. I have also shot a few on the Eden estuary, north of St Andrews, where small parties are usually found. These also were all dark-breasted birds. On the Forth I have seen too few to speak definitely of their colour, but six that I killed one day in 1887 were all dark-breasted birds.

Doubtless it is the case that both light- and dark-breasted birds breed together in Spitzbergen, Nova Zembla, and Kolguev, but we are now presented by a curious fact, if my observations are correct, that in certain firths and estuaries on the eastern coast of Scotland there is sharp differentiation between the winter habitat of the white-breasted and the dark-breasted Brent Geese.

It is more than probable that our Scottish Brent Geese are birds bred in Northern Europe, although the white-breasted ones seem to differ in no way from examples I have

seen in North America. But it is so far only a probability, and until we know more of the facts of migration we can only conjecture that we are supplied directly from the nearest breeding grounds. If, therefore, this is the case, and accepting the evidence of naturalists that in Arctic Europe birds of all phases of plumage, light, dark, and intermediate, breed together, how does it come to be a fact, and it is a fact which can be proved by receiving birds from the localities I mention, that the light-breasted and the dark-breasted birds occupy, broadly speaking, different areas in Scotland.

I spent the year 1916 in Arctic Europe, and though I was convinced that the spring and autumn migrations of Bean, Pink-footed, and probably White-fronted Geese proceed directly round or across Northern Finmark on the way to and from the breeding grounds, I could get no information of the Brent Geese although these birds were nesting only seventy miles away on Spitzbergen. I fancy that both the Spitzbergen birds and all those hatched on the islands to the east proceed *outwards* and then south across the North Sea, and do not, as other Geese do, skirt the coast lands of northern Norway and then cut across.

On another point I quite agree with Mr Chapman, that all phases of plumage of the Brent Goose are merely light, dark, or intermediate forms of colour in one and the same bird, and that all breed together. Any one who has made a close study of Ducks and Geese will find that in many species these light or dark forms are well marked. Take, for instance, the White-fronted Goose. In some examples on the breast there is scarcely a black feather, whilst in others the whole of the breast is entirely black; but these latter are rare.

The Cuckoo at Foula Isle.—I do not know if there are any reliable records of the visitation of the Cuckoo to this island. Some years ago a correspondence arose in the Shetland press as to whether the bird ever did visit the Isles; but I am informed that it occurs annually on both its spring and autumn migrations at Fair Isle. A writer to the *Shetland Times*

recently stated he had spent thirty-five summers on the mainland without ever having heard the Cuckoo until this May. On 25th May our postmaster informed me he had heard, unmistakably, repeated calls of the Cuckoo coming from Hamnafeldt Hill. I was anxious to confirm his statement, as I had been on the outlook for this bird during the last five springs spent on the island, and so far without success. I knew the bird would not remain long on the island, perhaps only a few hours. Owing to his hawk-like appearance the Cuckoo gets mobbed; the Skuas are the kings of mobbers, and the two species of Skua here having laid, were doubly fierce. I was unable to get out until the 26th, I knew my best chance would be along the shore, and I happened to be right. Within twenty minutes of leaving the house I came across not one but two Cuckoos, and for another twenty minutes had them under good observation. They showed no trace of rough handling, but were particularly wild and difficult to approach, never allowing me nearer than fifty yards.—Wm. Harry Greenaway.

Hen-harrier in Ayrshire.—On the evening of Monday, 23rd April 1917, Mr John Young, gamekeeper on Loudoun estate, brought to me a large hawk which his brother that day had found in one of his traps on the Windshield Moor, near Darvel. At first he was under the impression that it was a Kite (*Milvus ictinus*), but to make sure he very kindly brought it down to me for identification. On a close examination and perusal of Howard Saunders' *Manual of British Birds* we came to the conclusion that it was a male Hen-harrier (*Circus cyáneus*). Its upper parts were a uniform pale slate grey; rump white; white underparts; on the tail four or five bars of faint brown, also a few markings of the same colour on the flanks. This is the only record so far as I am aware of the Hen-harrier being in this locality. They were quite common on the South Ayrshire moors in the first half of last century. During the years 1850 to 1854, 351 were killed on Craiglure and Culzean estates, a sad and tragic story. The only other more recent record for Ayrshire is a report from Muirkirk district, where Mr Fairbairn saw three ringed-tailed Gleads circling high overhead about twenty-four years ago (*Glenfield Rambles Annals*). They are still to be seen in the Island of Arran, and I believe they still nest there; at anyrate they did at a very recent date.—Nicol Hopkins, Darvel.

SOME NOTES ON THE MICROSCOPICAL PREPARATION OF INSECTS.

By L. H. Huie, Department of Agricultural and Forest Entomology, Edinburgh University.

I have for some years past devoted considerable time and attention to the making of entomological preparations for the microscope, mainly with a view to teaching purposes. As in each case I endeavoured to show up the required characters in the best manner possible, I frequently submitted my specimens to several methods of preparation in order to find one entirely satisfactory. Perhaps some of the practical experience I have thus gained may be of use to other workers.

The commonest method of preparation of whole insects is that of making "transparencies," *i.e.*, the dissolving away by means of caustic potash or soda the internal tissues of the insect, leaving the chitinous exo-skeleton to be mounted in balsam, as a more or less transparent preparation to be examined by transmitted light. This is a simple method with which even a tyro is not likely to have many failures, though he will find that the strength of the KOH solution, and the time required for treatment with it, will vary with the species of insect. Fresh insects are cleared rather more quickly than those preserved in spirit or formalin. These must have the preserving fluid washed out by soaking in water, into which insects preserved in alcohol may be introduced more or less gradually. I give the following method as a sample for insects that have been preserved in 80 per cent. spirit:—

Remove the specimen to 50 per cent. alcohol.
Substitute plain water to remove all traces of alcohol.
Boil in 10 per cent. KOH solution for fifteen minutes (more or less according to species).
Wash thoroughly in distilled water.
Float the insect, if an adult with long appendages, on a

clean glass slide and lay out its appendages in the desired position.

Lay another slide on the top, protecting the specimen from too much pressure by a small square of paper or card laid on either side of it. The paper should be free from the powdery "dressing" that comes out of many writing papers when wet. I use thickish blotting paper, in one or two layers as required.

Bind the two slides together by a pair of small elastic bands, and place the whole in a jar of spirit (free of naphtha) and leave overnight, or longer.

Separate the slides. The insect, now quite rigid, will adhere to one of them. Gently push it into a watch-glass of absolute alcohol, or, if the specimen have delicate wings, it may be safer to leave it on the slide, and simply turn the latter over the watch-glass, making sure that the alcohol actually bathes the entire insect. Leave a short time to ensure dehydration.

Clear in clove oil or carbol-xylol.[1]

Mount in balsam.

In the case of larvæ and adults with short appendages, pressure between the slides is unnecessary. From the bath of distilled water they are taken through 50 per cent. alcohol, 90 per cent., to absolute alcohol.

In thus treating insects with KOH one must try to strike the happy medium between *under-clearing*, thus leaving remnants of undissolved tissue which will produce opaque blotches in the transparency, and *over-treatment*, which may destroy characteristic markings, etc., in the chitinous investment. If one has not before dealt with the species under treatment, it is wise to proceed cautiously, using one or two specimens experimentally if material is abundant, or when the specimens are few and precious taking them out of the KOH every few minutes (when they are seen to be clearing) for examination in clean

[1] This is the formula of Cole :—

Pure xylol . . . 100 c.c.
Absolute phenol . . 100 grammes.
Dissolve with gentle heat, and filter.

Modern Microscopy, 3rd edition, p. 283.

water under the microscope. I have specimens of various species of Hæmatopinus, where the result of striking the happy medium is that not only the exo-skeleton but also the tracheal system is beautifully displayed.

Some delicate insects would require the solution to be not stronger than 2 per cent., or the boiling might be limited to five minutes or even less. Others, especially such as have delicate wings, should not be boiled at all, but left to steep in cold KOH solution until their internal tissues have been sufficiently acted upon. This will take from one to several days.

Sometimes a heavy-bodied insect has comparatively delicate wings, which would be apt to be damaged if subjected to the amount of boiling required for the body. In very special cases I have occasionally found it advantageous to remove the wings carefully before the treatment with KOH, and only replace them when the insect is laid out in balsam on the slide. Lest they should float from their places when the cover-glass is put on, this should not be done till next day, the preparation meantime being protected from dust. A fresh drop of balsam is then to be placed on the specimen, and a warmed cover-glass applied.

In the case of *Hippobosca equina*, for example, one may thus boil the coarse body safely for twenty minutes in 10 per cent. KOH, which would have been ruinous to the fragile wings.

Fly Maggots are specially troublesome to clear in KOH, the reason being, I suppose, that the integument is not pierced by the laterally placed spiracles usual in other forms. To remedy this, one has to puncture the maggot by pricking with a needle in one or two places towards the middle of the body.

Many insects become too transparent by the KOH treatment, and yet important details of their structure cannot be shown up in preparations not rendered transparent. In this dilemma one has recourse to stains. I have found for this purpose, *i.e.*, for staining the chitinous exo-skeleton, acid fuchsin entirely satisfactory. It is most

imperative that the insect to be stained be very thoroughly cleared. If any vestiges of the internal tissues be left within the integument they will take the stain deeply, and appearing as unsightly blotches, spoil the preparation. To ensure perfect transparency I usually give my specimens a bath of glacial acetic acid after the KOH treatment. Cole,[1] indeed, recommends the constant use of the acetic bath, but most workers do not find it necessary, and I rarely use it when the insect is not afterwards to be stained. The following method of making stained preparations of Collembola, with the ventral tubes extended, gives beautiful results :—

Do not kill in the cyanide bottle, as the insects die in it with their tubes drawn in. Either induce the insects to jump into a fixing fluid, or having confined them in a small specimen tube, pour in a fixing fluid. I used Carnoy's fluid because it kills instantaneously. (Formula :—absolute alcohol, 6 parts; chloroform, 3 parts; glacial acetic acid, 1 part.)

After four hours, replace the Carnoy's fluid, by absolute alcohol to wash away the acetic acid.

Take down to water gradually, through three or four changes of diluted alcohol of diminishing strength. With specimens so delicate, this caution is not superfluous.

Leave in water till all trace of alcohol has disappeared.

Boil in KOH 5 per cent., for one or two minutes.

Wash in distilled water. This may be done with practically no manipulation by pouring the KOH solution containing the specimens into a little piece of "chiffon" (muslin is usually too coarse), and when the fluid has drained through, turning the cloth over a watch-glass of distilled water in which the insects float off. The distilled water may be changed several times by means of a pipette.

Substitute for the distilled water, glacial acetic acid.

After an hour or two, add to this bath one drop of acid fuchsin and leave overnight.

Remove the acetic acid, and wash in distilled water rapidly by means of a pipette.

[1] *Modern Microscopy* (Cross and Cole).

Substitute 50 per cent. alcohol for ten to twenty minutes.
Change the alcohol to 70 per cent. or 75 per cent. containing one or two drops of acid fuchsin, and leave overnight.
Wash out in the same strength of alcohol.
Dehydrate.
Clear in carbol-xylol.
Lift each specimen on to a slide with a wide enough pipette and lay out the antennæ and legs very gently and rapidly with a snipe's or woodcock's "point."[1]
With filter paper, take up any superfluous xylol quickly.
Put on a cover-glass on which has been placed a drop of balsam. Lower the cover-glass from the posterior dorsal region of the insect, so as to send the wave of balsam downwards and forwards, thus floating out legs, ventral tubes, and antennæ.

Collembola, stained as above, are also very beautiful mounted in eŭparal instead of balsam; indeed owing to the rather lower refractive index, the tubes are perhaps even better shown. In this case the carbol-xylol is dispensed with, and the specimens are mounted direct from absolute alcohol, being laid out in this on the slide. Scale insects and their larvæ, treated by these methods, also make fine preparations.

I have used other stains for chitin, but have not found one more generally satisfactory than acid fuchsin.

Many small insects may be mounted in balsam without previous treatment with KOH, a prolonged bath in clove oil, turpentine, or carbol-xylol rendering them sufficiently transparent; amongst such are small caterpillars and small imagines such as Cecidomyia. The muscular system and alimentary canal, etc., are often well seen in such preparations. Where the eyes of an insect are a character of systematic value as in *Pediculus vestimenti*, it is best to avoid the use of KOH, which destroys the pigment.

Chironomus larvæ are acknowledged to be troublesome

[1] One great advantage of carbol-xylol is that, during operations like this, it does not absorb moisture from the air so readily as other clearing agents.

objects to mount successfully, but the following method has given me excellent results :—

After catching, keep the larvæ for a day or two in clean water, that the alimentary canal may become emptied of its contents.

Pick the specimens out of the water and lay them on a cloth, place beside them a piece of cotton wool soaked in chloroform, and cover the whole with a tumbler. The larvæ will die immediately.

Transfer to 70 per cent. alcohol (not stronger, or the blood-gills will burst) and leave for twenty-four hours.

Substitute alcohol 75 per cent. and leave for twelve hours.

Increase the strength of the alcohol by 5 per cent. every twelve hours until the larvæ are in 95 per cent.

Increase to 97 or 98 per cent. and leave overnight.[1]

Substitute absolute alcohol and leave for twelve to twenty-four hours.

Replace by an equal mixture of alcohol and carbol-xylol.

After an hour or two transfer to pure carbol-xylol for an hour.

Make an equal mixture of carbol-xylol and clove oil, and introduce this into the dish containing the larvæ, without as yet drawing off the pure carbol-xylol. Wait for twenty-four hours.

Draw off this mixture and substitute a new supply of the equal mixture of carbol-xylol and clove oil, and leave for a day.

Add a drop of clove oil at intervals for a day or two until the mixture is more than 75 per cent. clove oil.

Substitute pure clove oil, and leave for some hours.

The specimen, with this care, should have gone through all the changes without rupturing or losing its cylindrical form, and may now be mounted in very dilute balsam in an excavated slide.

The critical points at which collapse is most likely to occur are, 1st, in putting into absolute alcohol, and 2nd, in making the exchange from carbol-xylol to clove oil.

I use clove oil because the transference directly from carbol-xylol to balsam caused serious collapse. The bath of

[1] Absolute alcohol itself is 98 per cent., but in practice we usually regard it as practically water-free, and the above directions are given on that assumption.

carbol-xylol is useful, however, as an intermediary, and also ensures perfect dehydration.

These preparations are interesting, the internal organs being well seen *in situ*. The larva may also be killed by being dropped into hot water (not boiling, but "newly off the boil") and kept hot for ten minutes to fix the tissues. The specimen is then transferred to 30 per cent. alcohol and taken up by gradations of 5 per cent. to absolute alcohol —a more tedious process.

I have sometimes been asked why I do not more often use glycerine jelly as a medium for mounting insects, convenient and quick of application as it seems. In the first place few insects are transparent enough to be mounted in it with a view to examination by transmitted light, and it does not add transparency to them to the extent that mounting in balsam does. Another objection is that it is apt to crush delicate structures, antennæ, etc. There are cases, however, when insects treated by KOH become rather too transparent in balsam, and yet are sufficiently well shown in glycerine jelly, because of its lower refractive index. When this is the case the trouble of staining may thus be saved. I give the following method for preparing *Trichodectes latus*, as a sample of a case where glycerine jelly was preferable to balsam as a mounting medium. The difficulty with Trichodectes is to display the front legs, which are small and have an obstinate tendency to curve inwards and disappear altogether under the broad head, a tendency which is increased by treatment with alcohol. In pulling them out one is very apt to break them. With the glycerine jelly method, alcohol is avoided altogether, and the legs retaining their flexibility throughout the process, can eventually be "coaxed" into position without any manipulation. The material was preserved in formalin :—

After washing out the formalin, boil in KOH twelve minutes.
Wash well in distilled water.
Treat with glacial acetic acid about six hours.
Wash in several changes of water.
Leave in water overnight.
Mount in glycerine jelly, using plenty of it.

While keeping the slide warm, gently move the cover by pressure with a blunt needle point, thus causing the front legs to expand. Of course this must be done under a lens.

A simple way of keeping a slide warm in the absence of a hot metal plate is to fill an ordinary 6 or 8 oz. medicine bottle with hot water, and lay it on its broad side with the slide upon it. The hot water may be tinted if desired. I mounted some *Hæmatopinus macrocephalus* in glycerine jelly, because I thought that it showed up the tracheal system rather better than was the case with balsam; but I found it necessary to employ the following rather elaborate method,[1] because the specimens proved apt to be crushed by sudden transference from water to glycerine jelly:—

Boil in KOH 5 per cent. for twenty minutes.
Wash in distilled water.
Substitute 50 per cent. alcohol and leave for twenty minutes.
Increase the alcohol to 70 per cent. and leave for ten minutes.
Substitute 70 per cent. alcohol containing 5 per cent. glycerine. (The glycerine and water may be warmed to dissolve the glycerine before the alcohol is added.) Leave the Hæmatopinus in this for six hours in a closed vessel.
Substitute 10 per cent. glycerine in 70 per cent. alcohol, and leave for six hours or longer.
Substitute 20 per cent. glycerine in 70 per cent. alcohol, and, after six hours, remove the cover of the vessel and allow the alcohol to evaporate, precautions being taken to protect the vessel meantime from dust.
Mount on a plain slide in glycerine jelly.
Press lightly with a blunt needle on the cover-glass, above the head or front thorax, making a tremulous movement. The claws will turn outwards. Pressure on the abdomen is apt to cause more or less distortion.

It is sometimes advisable to use Farrant's solution as a substitute for glycerine jelly, as it allows of more deliberation in the laying out of delicate objects. For example, I have some successful mounts of Aphides, in which the

[1] Adapted from directions in Stephen and Christopher's *Practical Study of Malaria.*

object was to display the mouth parts, and which were prepared as follows:—

Boil for three minutes in 10 per cent. KOH to open and separate the mouth parts.
Wash in distilled water.
Treat with glacial acetic acid twelve to twenty-four hours.
Wash.
Mount in Farrant's solution (preferably) because of its low refractive index, and because in this medium it is easier to lay out the slender and delicate appendages upon which glycerine jelly is apt to set too heavily.

For sealing up I use balsam, because if the cover-glass gets broken at any time it is easier to renew it and save the preparation, than is the case where a black cement has been used.

To Dr Ashworth I owe the following directions for mounting in formalin, a useful method when it is desired to preserve small creatures as far as possible in their natural aspect:—

Fill an excavated glass slide with 10 per cent. formalin, put in the insect, cover, and seal up with balsam. The insect might be previously *somewhat* flattened out in formalin to put its appendages in position, but not pressed so as to squeeze it. The water used to dilute the formalin must be well boiled, or bubbles will appear in the preparation.

Dr Ashworth advises that the insect be killed by boiling water, and transferred to alcohol 70 to 85 per cent. Before mounting get down to water and then into a relatively large quantity of 10 per cent. formalin.

I found this good, for instance with ant larvæ, when I wished to display the curious forked hairs, which in balsam or glycerine become too transparent.

For dissections of insects I have no suggestions to add to the usual routine of fixing, staining, and mounting on the slide, unless it be to substitute sometimes Unna's polychrome methylene blue for the usual borax or alum carmine. It is differentiated with alcohol, and, to my thinking, the blue colour is pleasanter to the eye than red.

With regard to sections, of course the tissues must be "fixed," and many insects because of their chitinous and hairy investment must be cut in order to allow the fluid to penetrate. But for teaching and other purposes it is sometimes desired to make transverse and longitudinal sections of an entire insect. With this object in view, it is best, if one is at liberty to choose, to select an insect which is as free as possible from hairs. The following method gave perfectly satisfactory results with Ephemerid larvæ and nymphs :—

Lift each specimen from the water in which it has been living, and touch it for a moment with blotting paper or a cloth to dry it slightly.

Drop it alive into Carnoy's fluid, which kills it instantly, and leave for four hours.

Transfer to absolute alcohol for a day or two, changing the alcohol several times until all trace of the acetic acid has disappeared.

Transfer to cedar oil and leave till clear.

After this take it through the paraffin process in the usual way, using 52° paraffin, and cedar oil as a solvent, because it causes less brittleness than chloroform or xylol. With the Cambridge "rocker" the sections should be cut about 5 μ (8 teeth).

Any of the customary staining methods may be used.

I like Carnoy's fixative because it kills instantaneously, is very penetrating, and, according to my experience, causes no shrinkage.[1] For embryological work I have lately used Bles's fluid with perfect satisfaction (alcohol 70 per cent., 90 parts; formalin, 7 parts; glacial acetic acid, 3 parts). Some skilled workers have recently advocated the use of strong formalin (Schering's solution) especially for killing larvæ. When I tried it for Chironomus larvæ it ruptured the blood gills; but the method deserves attention. As every entomologist knows, dropping into boiling water is one of the best as well as the most humane means of killing larvæ for ordinary purposes, but I doubt if by this means the various tissues would be fixed in a way suitable for histological study.

[1] If allowed to act too long, Carnoy's fluid will cause swelling.

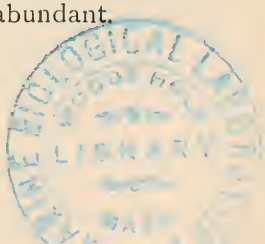
Dr Gustav Mann suggested to me the following plan for embedding insects with tough integuments. I have not yet had occasion to try it:—

Dehydrate thoroughly.
Place in $\frac{1}{2}$ per cent. celloidin in ether, and alcohol amylacetate equal parts for two days.
Transfer to pure chloroform to harden the celloidin (three changes).
Saturate gradually with paraffin in ordinary room temperature, then at 40° C., then at 60° C.
Very gradually evaporate the chloroform.
Cut as paraffin sections.

This method has the additional advantage that it does not require a paraffin "incubator."

A simple method for pure paraffin embedding, in the absence of an incubator, is given in Stephen and Christopher's *Practical Study of Malaria.* The "embedding apparatus" is simply "a slab of copper $12 \times 3 \times \frac{1}{4}$ ins. Heat this at one end, and place the vessel containing the paraffin at a point on the slab where the paraffin is just kept melted. This is the temperature for embedding. This simple device serves all the purpose of an elaborate paraffin oven." I am using it constantly now for embryological work, and have not had a single failure in embedding the insects' eggs. The specimens must be watched all the time of course—about half-an-hour in my experience—but probably this time might safely be shortened.

Obviously this paper does not profess to be more than a sketch of some of the chief methods employed, and an indication of some of the pitfalls to be avoided. Every worker on special lines evolves adaptations of method suited to his specialty. It has been my own good fortune, through the kindness of Dr Stewart MacDougall, to enjoy exceptional opportunities of handling a large and varied material. Possibly these notes may prove useful to others, whose specimens of valued forms may be none too abundant.



Crabro peltarius, Schreb., in East Lothian, and Osmia rufa, L., in Midlothian (Forth).—On 17th June 1916 I captured a male of *Crabro peltarius* on the links about a mile east of Port Seton, East Lothian, as it settled on a burnet rose. This is the only occasion on which I have recognised this Aculeate in Forth, and so far as I know it is the first record for the area. Its near ally, *C. cribrarius*, is a common insect with us.

To Mr J. W. Bowhill I am indebted for a male of *Osmia rufa*, which he caught on the roadside near Hawthornden station, Midlothian, on 29th May 1903. This seems to be but the second Forth record, the first being that of a female from near Dunbar, 7th July 1900 (see my note in *Ent. Mo. Mag.*, 1900, p. 265).—William Evans, Edinburgh.

Venusia cambrica, Curt., in Midlothian (Forth).—While collecting in the woods above Polton, Midlothian, on 20th July this year, I detected two examples of the "Welsh Wave" (*Venusia cambrica*) at rest on the trunk of an oak. Both were secured, and proved to be males. In a paper on Forth Lepidoptera in *Ann. Scot. Nat. Hist.* for July 1905, I recorded a specimen of this moth from Luffness Woods, East Lothian (July 1904), and I have another taken at Tyninghame in the same county in July 1910. Miss Balfour, as she has kindly informed me, has also one taken in East Lothian, so long ago as 1881. These are the only Forth records known to me.—William Evans, Edinburgh.

Molluscan Authentications for Dumbartonshire.—Mr William Rennie has submitted specimens of various mollusca found at Milngavie, on the banks of the Allander, 9th June 1917—including an example of *Pisidium nitidum*, not before authenticated for this Vice-county. He also examined the soft mud flat left by the lowering of level of the Clober Dam, fed from the Allander Water, Milngavie, on the 16th June 1917, and found *Limnæa peregra* plentiful, quite a number of *Valvata piscinalis*, and one fine example of *Planorbis contortus*. He allowed me to see the last two, which are new authentications for Co. Dumbarton, as are also examples of *Sphærium corneum*, *Pisidium subtruncatum*, *Arion subfuscus*, and *Agriolimax lævis*, found by the same observer in and near Clober Dam, 14th July 1917. Assistance of this kind throughout Scotland is much valued and appreciated for the Conchological Society's Census and records.—W. Denison Roebuck, 259 Hyde Park Road, Leeds.

(*Authors are responsible for nomenclature used.*)

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SOME NOTES AND OBSERVATIONS ON THE MOLE IN CAPTIVITY.

By Frances Pitt.

(*Concluded.*)

Smell is the sense upon which moles depend to find a living, yet in those I have kept it did not seem so acute as I had expected. All my moles knew at once when worms were at hand, but did not appear to know in which direction to look for them, and generally rushed about for some seconds before at last chancing upon them. Very possibly the sense is affected by captivity, and in a natural state they are no doubt sensitive to vibrations of the ground, but in a cage they soon become indifferent to being shaken. Mole No. 2, which was kept in the sitting-room, paid no attention when the table was bumped, things thrown down on it, or his cage was pushed to one side. He would sleep peacefully through it all, or go on with his meal in seeming indifference. No. 4 was at first terrified when her box was shaken, but at the end of three days had learnt that it only meant worms, and would come to the side at once for them, scratching at the glass, and trying to get up it.

A noticeable difference between the male and female moles that I kept was that the former smelt so much more strongly than the latter. The cage a big mole was kept in was quite unpleasant in the sitting-room, but that of a small mole was not at all offensive. Another difference between the sexes is the bolder disposition of the male. When I had a male and female in captivity at the same time, this was very apparent. The little one (No. 4) was still shy and nervous after being four days in the cage, by which time the bigger one (No. 5) was quite at home and had lost all fear.

That the mole is as fierce as tradition asserts I am quite prepared to endorse. One afternoon my brother brought in a dead mole, and suggested we should see what No. 2 thought of it. The minute we tapped the glass he scrambled out of the nest evidently thinking we had food for him, whereupon W. P. touched him on the tail with the dead mole. Round he spun, only to be poked in the back with the corpse, but before W. P. could snatch it away the mole had grabbed his inanimate foe. Frightened that the skin would be spoilt (skins are worth considering when they are 6d. or more apiece!) we pulled him off. He was very excited, dancing with fury, and seemed as if "possessed by a devil." When the body was held near him again he fairly sprang at it, seized it by the nose, and held on like a ferret. We lifted him in the air, and still he clung to it, using his paws as well as his teeth to tear at the foe. Three minutes, five minutes passed, and still he showed no sign of relaxing his grip. At last W. P. got hold of him and pulled, but it was only with difficulty we got him away. Then he raced round the cage, smelling everywhere for his victim, and evidently mad to continue the attack. Not even a shrew could have shown greater ferocity, and I am sure if the second mole had been alive they would have fought to the death.

I am sure that no one who has not watched a mole feeding, bed-making, and attacking an enemy, can have an idea of the little creature's intense energy and rapidity of movement; it can run backward as quickly as forward, it

rushes here and there, it sniffs and it smells, and even when it retires to its nest it is still in the same energetic manner.

At this time I had a mole, No. 3, which was kept in a tub in an outhouse, and my brother was anxious to see what would happen if the two were put together, but I was so sure that the result would be fatal that I refused to try the experiment. By a curious coincidence, for live moles are generally difficult to get, another unhurt mole had been caught the same day No. 3 was taken; so the mole-catcher popped them into his pocket, thinking I should like a couple, but when he got to the house only one came out alive. The other was dead. "I heard 'em squeaking," he said, "but didn't think much about it."

As I wished to get a photograph of my tame mole when he was worrying a dead one, I took him out-of-doors and put him on a table in front of the camera. He seemed nervous in the open air, and ran to the edge of the table, but seemed aware there was a drop before him, and drew back in a hurry. He repeated the same thing on the other side, and appeared to know, though he could hardly have seen, that he would have a fall if he ventured further.

I have said that this mole was bold, but I frightened him badly by putting a dead bird in his cage. The cat had killed a robin, so I took it from her to see what the mole would do to it; but the minute he smelt it he cocked his scrap of a tail, dug frantically, and was some minutes before he ventured on the surface again. I then offered him a leg, without feathers on it, but down he went again once more, with every sign of panic.

I lost this mole after I had had him thirty days, to my great regret, for he was quite a personality. There was a crack in the glass at one side of the cage into which he must have managed to insert his strong claws, for in the morning the piece of glass had been pulled out and the mole had vanished. His fate remained a mystery for nearly a fortnight, and then there arose a most peculiar smell in a hot-air cupboard. The poor mole had got behind the wainscoting and there died. The carpenter was sent for, who sniffed appreciatively and remarked it was "A fine

stink," but that as it was only a small animal, and it would be an "awkward business" to get it out, he advised leaving the corpse where it was, for the smell "wouldn't last more than a week." But for that week, and somewhat longer, we might have quoted that oft-used inscription on tombstones, "In death he was not forgotten," with much more sincerity than the relations of some deceased people feel when they have it inscribed!

Late Singing of the Missel-thrush.—On the evening of 7th June 1917 I heard a Missel-thrush in full song near Cathcart. Twice only before have I heard the spring song of this species after May was out—on 3rd June 1898, near Kames Castle in Bute, and on 6th June 1908 at Braidwood, Lanarkshire. Seebohm says that the Stormcock, "unlike all his congeners, performs the duties of breeding in silence." Such is not the case in "Clyde," where it is usually heard to best advantage about the end of April, in the very height of its breeding season.—JOHN ROBERTSON.

Campodea fragilis, Mein., in Scotland (Forth).—When Prof. Carpenter and I prepared the short list of Forth Thysanura (Bristle-tails) published in the *Proceedings of the Royal Physical Society* in 1899 (xiv., p. 260), only one species of Campodea was recognised as British, namely *C. staphylinus*, Westw., to which all our specimens were referred. Now, according to Mr R. S. Bagnall (*Ent. Mo. Mag.*, Sept. 1915), it is known that five or six species occur in this country. One of them is *C. fragilis*, Meinert, and the purpose of this note is to record its presence in Scotland. On 19th May 1914 I was collecting on the Isle of May. On pulling back the turf at the foot of the wall enclosing the south garden a colony of a species of Campodea was brought to light. The three examples secured—in all nine or ten were seen—seemed to differ from the common form in their yellower colour and other respects. In Lubbock's *Monograph* (1873) only two species of this genus, *C. staphylinus* and *C. fragilis*, are given, and to the latter my Isle of May specimens were provisionally referred. They have recently been examined by Mr Bagnall, who writes me that they are *C. fragilis*, Meinert.—WILLIAM EVANS, Edinburgh.

ON SOME OF THE SCARCER FISHES IN THE ABERDEEN MARKET.

By D'Arcy Wentworth Thompson.

I. The Northern Chimæra (*C. monstrosa*, L.).

For a good many years past, under Dr Fulton's direction, a record has been kept by the Aberdeen Fishery Officer and his staff of the rarer fishes brought in from time to time by deep-sea trawlers and liners to the market. Most of the work has been done by Mr James Robb, clerk in charge of the market-statistics under the Scottish Fishery Board, and we are greatly indebted to him for a long series of careful observations. The record does not claim to be a very scientific one. Not a few rare or little-known species have probably escaped notice, or have been confused occasionally with closely allied forms. The rarer skates, for instance, could only be dealt with by a specialist; for even ichthyologists are still imperfectly acquainted with them. Such fishes as these, then, we must leave out of account. Moreover, a multitude of interesting things never come to land at all; they do not attract the notice of the fishermen, but are thrown overboard with the debris of the trawl. It is a matter of infinite regret to the naturalist that the vast explorations of our deep-sea fishermen should bring in so small a scientific harvest, and that, in spite of all this immense commercial investigation of the sea, our knowledge of the distribution of its fauna should remain as scanty as it is. But taking what we can get, we have still much to be thankful for; and it is in the number and long sequence of these Aberdeen observations that their value lies.

The occasional occurrence on one part or another of our coast of some rare whale or fish is an event that, of itself, has very little importance and teaches us very little. It is, or seems to be, a sort of accident; the creature comes our way, we don't know whence or why. The "range" of the species

is perhaps (as we say) extended; our faunal lists have, perchance, a new item added to them; and that is well-nigh all, and it comes to little. But let that occasional event repeat itself a dozen or a score of times, and new facts appear and new problems emerge from the accumulated record. For we have now facts to *classify;* we can group the several occurrences according to place and according to time; and we can in the end do something towards discovering the

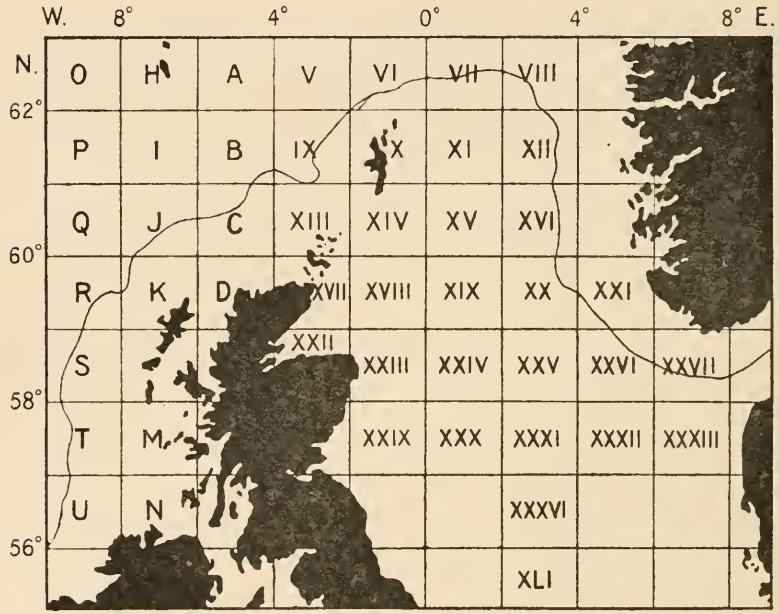

Fig. 1. Key-Map of the Scottish Fishery Board's Statistical Areas.

habitat, or towards tracing the seasonal migrations of the species. The date of each capture, often neglected in the older accounts (as, for instance, in Day's *British Fishes*), becomes a matter of cogent interest; for place and season now become part of a common story.

The recorded localities and seasons of capture of our fishes must be studied, like everything else, subject to certain reservations. We are not dealing with sufficient or adequate material, but only with fragments of information. The

records are restricted (1) by the fact that our trawlers fish on limited areas, more or less closely defined by conditions of depth; (2) by the fact that experience has taught them to resort to certain particular grounds, mainly or sometimes exclusively, at particular seasons of the year; and (3) by the broad fact that the fishing fleets tend to be concentrated on certain areas, and to fish but sparsely on others. Our trawlers seldom fish, as yet, very much beyond the 100-fathoms line; the liners fish at times in deeper water, but their records of rare fish are few. In short, our market observations teach us little or nothing of the fish-life beyond the comparatively narrow limit of 100 fathoms. We have thus to guard, in general, against the use of negative evidence; but let us try, in a particular case, to see how far the available and positive evidence may serve to carry us.

That curious and ancient fish the Northern Chimæra, or King of the Herrings, has been known since Pennant's day, and Dr Fleming's, as an inhabitant of the Shetland seas; and also, as a Norwegian fish, since the days of Gesner and of Pontoppidan. From its great cutting teeth, the Shetland fishermen call it the Rabbit-fish; and others, taking into account its long tapering tail, call it (still better) the Rat-fish, under which name Pontoppidan records it, and which name the allied species, *C. Colliei*, goes by on the Pacific coast.

Our Chimæra does not appear to cross the Atlantic, though it is common in Iceland: it is said to range as far south as the Cape of Good Hope; and it was formerly believed to go as far as Japan, but the Japanese fish is now held to be distinct (*C. phantasma*, Jordan and Snyder). Over a dozen species of the genus are known, some six of them from Japan, and all but three of them from the Pacific region. The three Atlantic species include, besides the old and well-known *C. monstrosa*, the two following, viz.: (1) *C. affinis*, Capelle, which is known from both sides of the Atlantic; and (2) *C. mirabilis*, Collett, a species first discovered in very deep water between the Faeroes and the Hebrides, again by the *Goldseeker* S.W. of the Faeroes, and again found repeatedly by Holt and Byrne off the W. and S.W. of Ireland.

The latter species is not known from less depths than 250 fathoms, or even more, and its principal haunts are below 500 fathoms. The former is also a deep-water fish, from 200 to 1200 fathoms. Neither, therefore, is likely to be caught by our fishermen ; and the records (as we shall now see) of our own Chimæras so hang together that we have no reason to suspect that they have to do with more than a single, and that the common species.

Our market observations go back to 1909, with a few earlier and more scattered ones ; and the following is a list of our records of Chimæra :—

Date.	No. of Fish.	Locality.	Statistical Area.
Feb. 1902	1	23 m. E.S.E. of Aberdeen	XXIII
July 1902	1	100 m. N. by E. from Ronaldshay	IX
(The above recorded by Dr Fulton, in *Scottish Fishery Board's Report*, xxi. (pt. iii.), 1902, p. 228.)			
April 1909	12	Iceland	...
June 1909	2	30 m. N. by W. of Noup Head (hooked)	XIII
Dec. 1909	1	180 m. E.N.E. of Aberdeen	XVI
Jan. 1910	17	194 m. E.N.E. of Aberdeen	XVI
Jan. 1910	1	180 m. E.N.E. of Aberdeen	XVI
Jan. 1910	11	180 m. E.N.E. of Aberdeen	XVI
March 1910	1	Iceland	...
Aug. 1910	2	80 m. N. by W. from Hoy (hooked)	C
Oct. 1910	11	Viking Bank	XII
Feb. 1911	1	180 m. N.E. by E., ½ E. from Aberdeen	XV
July 1911	1	25 m. N.N.W. from Flannan Isles (hooked)	K
Aug. 1911	3	36 m. N.W. by N. from Foula (hooked)	IX
Aug. 1911	3	23 and 40 m. N.W. by W. from Butt of Lewes	K
Sept. 1911	3	40 m. N.W. from Rona's Hill	IX
Sept. 1911	2	18 m. N. from Flannan Isles	K
Jan. 1912	4	110 m. E.N.E. from Aberdeen	XIX
May 1912	1	235 m. N.E. from Buchanness	XI
Sept. 1912	1	30 m. W.N.W. from Flannan Isles	R
Dec. 1912	2	205 m. E. by N. ½ N. from Aberdeen	XX
April 1913	1	20 m. N.W. from Flugga	X
May 1913	2	5 m. W. from Barra Head	L
June 1913	25	Iceland	...
June 1913	1	18 m. N.W. from Sule Skerry	K
June 1913	4	45 m. W.N.W. from Butt of Lewes	K
June 1913	5	80 m W.N.W. from Old Man of Hoy	C
July 1913	2	25 m. N.W. from Sule Skerry	J
Nov. 1913	11	No locality	...
Dec. 1913	4	160 m. E.N.E. from Aberdeen	XIX
Feb. 1914	1	220 m. N.E. ½ E. from Aberdeen	XI
March 1914	13	235 m. N.E., northerly from Buchanness	XI
June 1914	1	5 m. N. from Rona	C
June 1914	4	17 m. W.N.W. from Stack Skerry	C
Sept. 1914	1	27 m. N.E. by E. from St Kilda	S
Sept. 1914	1	44 m. W. by N. from Barra Head	T
March 1915	1	20 m. N.E. from Flugga	VI

The above Data, arranged according to Season.

Month.	No. of Captures.	Total No. of Fish.	Areas. East of 2° W.	Areas. West of 2° W.
January	4	33	XVI, XIX	...
February	3	3	XI, XV, (XXIII)	...
March	2	14	VI, XI	...
April	1	1	X	..
May	2	3	XI	L
June	6	17	...	C, K, XIII
July	3	4	...	J, K, IX
August	3	8	...	C, K, IX
September	5	8	...	K, R, S, T, IX
October	1	11	XII	...
November	1	11	?	...
December	3	7	XVI, XX	...
	34	120		

Furthermore, the *Goldseeker* took one specimen, a female 43 cm. long, on 23rd August 1909, at 59° 26′ N., 8° 24′ W., at a depth of 1257 metres; and a very young female, 20 cm. long, on 18th July 1913, at 61° 34′ N., 2° 4′ E., at a depth of 380 metres. But these two occurrences, the former by reason of its remoteness and great depth, the latter both by reason of the depth and the small size or youth of the specimen, belong to a different category from the rest.

To these observations of our own, I may add (apart from the W. of Ireland examples of which we shall speak afterwards) one fish recorded by Meek from the Pentland Firth, in August 1901; and two recorded by Holt from the deep water north of the Great Fisher Bank, in the second week of May 1893.

Let us plot these various occurrences, somewhat roughly, on a chart (Fig. 2), not attempting to define the precise locality of each, but simply arranging them within the squares (of 2° longitude and 1° latitude) which we are accustomed to use in dealing with our fishery statistics. We then see at once that they all group themselves in a sort of belt, running from near the mouth of the Skagerack, round the Shetlands and to the west of the Lewes, and so keeping, on the whole, near and parallel to the 100-fathom line.[1] They do not come

[1] I have omitted from this and other charts the fish recorded from 23 miles E.S.E. of Aberdeen, in February 1902. This record was quite exceptional, so much so that one is even tempted to doubt whether the place of capture was correctly given.

southward into the North Sea beyond the parallel of 58° N., so far as our observations go; and their proximity to the 100-fathom line would suggest that the fish are to be looked on as more or less periodic immigrants to our shallower seas from deeper water (very likely just beyond the line), where we fail to catch or follow them. Within the belt throughout which we do find them, there is little or no evidence of their being more abundant in one part than another. We have had, doubtless, a few more individuals from one square than another, but bearing in mind the great local inequalities in

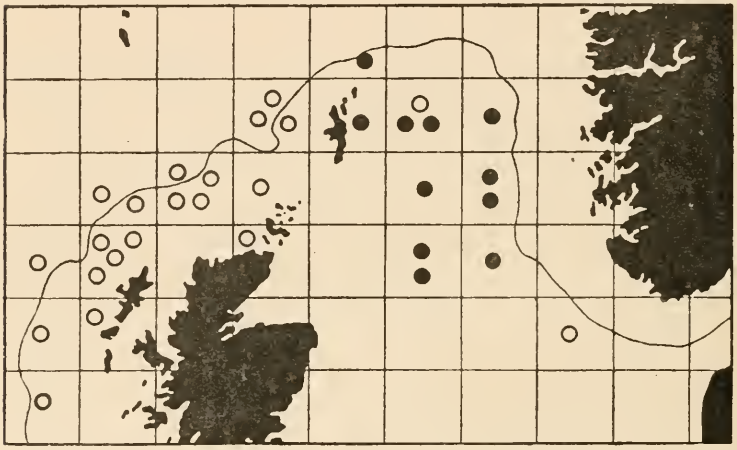

FIG. 2. DISTRIBUTION OF CHIMÆRA ACCORDING TO THE ABERDEEN RECORDS.
● October to April. ○ May to September.

the amount of fishing, such statistical evidence goes for little, and the actual discrepancies are not great enough to be significant.

But we reach firmer ground when we begin to consider the times of year when the various specimens were captured. On Fig. 2 I have distinguished between the captures from May to September, and those from October to April. It will be seen that these two seasons correspond, all but precisely, to a definite geographical distribution; the winter captures were all (or practically all) to the east, and the summer captures are in like manner to the west, of the Shetland Isles. Mr Holt's Fisher Bank specimens form an

exception on the map, but it is so slight that it may be looked on as one of those exceptions that are said to prove the rule; for his fish were caught in the second week of May, only a fortnight beyond our seasonal limit.

We may, however, by using a statistical device of averaging and of "smoothing," bring a good deal more out of these seasonal data. Let us take, for each square, the average date of the captures therein. For instance, in the area (K) north and north-west of the Lewes, we have had captures in June (6), July (7), August (8), and

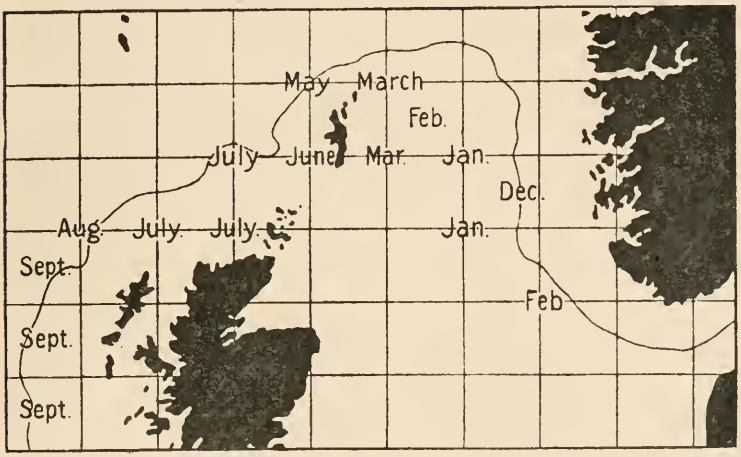

FIG. 3. APPROXIMATE SEASONAL DISTRIBUTION OF CHIMÆRA, BASED ON THE AVERAGE DATES OF CAPTURE IN CONTIGUOUS SQUARES.

September (9); the mean is 7·5. Let us call it, in round numbers 8, and ascribe it to it. We shall find that these average dates for the several areas group themselves in a fairly orderly way upon our map. But let us further "smooth" them by taking a *mean* value wherever four (or three) areas meet at a point; that is to say, let us replace the values *within* the squares by mean values *at the corners*, or junctions, thereof. This I have done in Fig. 3, and the result is remarkable. We see a steady *tendency* (it is of course no more than a tendency, and is subject to exceptions) for the average dates of the occurrence of Chimæra to get later and later, as we pass along our belt of stations from

east to west. The dates begin in mid-winter (December to January) in the extreme east, off the deep water of the Norwegian Rift; the mean season around the Shetlands is from March to June; that off the West Coast and the Lewes is not earlier than July; while all our captures to the west of the Lewes were made in the month of September.

Before accepting this evidence, clear as it may seem to be, we must remember that the amount of trawling carried on to the E. and N.E. of the Shetlands is at its maximum in the spring of the year; and that accordingly we are not dealing in this region with a "fair sample," or uniform record, of all-the-year-round fishing. In making allowances for this, we may be helped by a comparison of our results in regard to other fishes. If other of the rarer kinds were to show similar results to those we have just discovered in the case of Chimæra, we should naturally suspect that these results were biassed by the nature and season of the fishing operations. But we shall find that this is not so. The phenomena in the case of Chimæra are on the whole peculiar to that species, and we may safely draw the conclusion that they give us a fair picture of its seasonal distribution and of its natural movements.

We must now begin to supplement our own records by what we may learn elsewhere, and especially from Ireland and from Norway. In the records of the Irish Fishery Investigations we have a number of captures of Chimæra, and Mr Holt has furnished me with some additional MS. notes from his log-books. We have in all, from this source, records of *Chimæra monstrosa* from eighteen of the Irish deep-sea trawling experiments, yielding in all about thirty-two specimens, besides two more captured by a commercial trawler. They are all from the W. and S.W. of Ireland, all between 50° and 54° N., and between 11° and 12°30′ W.: the great majority lie between 51° and 52° N., and between 11°30′ and 12° W.

These Irish records, like our own, seem to indicate a certain amount of periodicity, though the case is complicated by the irregular distribution of the experiments throughout

the months. The bulk of the captures fall in the month of May, and there is a distinct lack of them in the summer months: all in direct contrast to what we have found on the W. of Scotland. And I am inclined to put more trust in this scanty evidence than I might otherwise do, because, for the allied species *C. mirabilis*, the Irish records show a similar, but in this case an opposite, periodicity—most of the captures of this latter fish having been made during August and September.[1] This is shown in the following table:—

	C. monstrosa.			*C. mirabilis.*		
	Records of Capture.	No. of Fish.	Mean Depth. Fathoms.	Records of Capture.	No. of Fish.	Mean Depth. Fathoms.
Feb.	...	...	...	2	9	581
May	10	18	363	4	13	685
July	3	5	180	...	...	...
Aug.	1	1	695	9	34	552
Sept.	2	2	645	8	31	621
Nov.	2	6	170	1	2	532
	18	32	300 (median)	24	89	610 (median)

With regard to the more numerous captures of *C. mirabilis* in the autumn months, we might suspect that more trawling had been done at that season than at others, in the great depths where this species lives; and that therefore its seasonal increase was more apparent than real. But while comparatively little deep-sea trawling seems to have been done in February and November, yet (judging from the published records) the amount done in May is not incommensurate with that done in August and September.[2] I conclude that there is, at least, some provisional evidence that *C. mirabilis* increases in abundance in this region towards autumn, while *C. monstrosa* is most abundant in

[1] Three specimens of *C. mirabilis* were obtained by the *Goldseeker*, together with the adult specimen of *C. monstrosa* already mentioned, in August 1909, at 59° 26′ N., 8° 24′ W. (S.W. of the Faeroes), at a depth of 1257 metres.

[2] As far as I can make out from the Irish "Lists of Stations," the number of hauls of beam and otter trawl in depths below (or very near to) 500 fathoms, in the years 1901-12, was as follows: February, 2; May, 18; August, 26; September, 15; November, 2.

spring. And further, while we have no evidence in the case of *C. mirabilis* of its capture at different depths in different seasons, we do seem to have such evidence in the case of *C. monstrosa;* for the few captures in August and September came from much deeper water than, on the average, did those caught at other seasons of the year.

From the Cardiff trawlers, which do much of their fishing in Atlantic waters and at greater depths than our Aberdeen boats resort to, we might expect very valuable information, and a foretaste of this I already owe to Mr J. J. Neale and to Lieut. C. C. Morly of Cardiff. Mr Neale tells us that his boats find Chimæra numerous, almost plentiful at times, in from 100 to 200 fathoms, and occasionally in less. They get it from the W. and S.W. of Ireland right away to the Spanish coast; it is said, moreover, to occur in the deep water all the year round. In a recent note from Mr Neale's firm (Messrs Neale & West) I am told that one of the chief localities is about 250 miles west of Lundy Island, in 200 fathoms, and that here the fish is most abundant in summer time. Lieut. Morly tells me that the greatest quantities, as much as "two kit, in a 200-kit catch of fish," are got in the deep water west of Tory and Eagle Islands; and that there it is in the winter time that it is most abundant.

The egg of Chimæra is a large and conspicuous object, being laid in a horny case, something like a Skate's egg-purse, only more elongated and without the "horns." Two eggs only are ripened and laid at one time, but, just as in the skate, others come on in succession, and the breeding season may thus be very considerably protracted. The egg was a rare thing in collections, until Dr Bashford Dean obtained it in some abundance from the shallow-water species of the North Pacific, *C. Colliei.* The unlaid or ovarian egg of *C. monstrosa* was known (as Mr J. Grieg tells us) to Bishop Gunnerus of Trondhjem, in the eighteenth century; and a mutilated egg was found on the shore of the Namdala, according to Collett, in July 1871. But the first clearly recognised and authenticated specimen of a ripe and spawned egg was found by Mr Green, and described and

identified by Dr Günther, in July 1889, in the *Flying Fox* Expedition, off the S.W. of Ireland, in 315 fathoms; another specimen was got in the same region by Mr Holt, in November 1904, in 337 fathoms.

Four "small specimens" of the fish were got by the *Travailleur* Expedition (1882) in the Bay of Biscay, at from 433 to 670 fathoms (Vaillant); the smallest measured 13 cm., and still bore remains of the yolk-sac. One was got by the *Knight Errant* in the Faeroe Channel, in 555 fathoms (Günther); it measured 5 in. in length of trunk, and therefore, presumably, about 7 in., or 17·5 cm., in total length. Three were obtained by the *Triton* in the same region (Günther), in from 505 to 555 fathoms; they measured in length of trunk $1\frac{1}{2}$, $2\frac{1}{2}$, and 3 in., or say 5, 9, 10·5 cm. in total length. Two more were got by Mr Holt off the S.W. of Ireland: one of 13 cm. (September 1907), in 491 to 520 fathoms; and one (August 1907) of 19 cm., in 707 to 710 fathoms. It is very noteworthy that these smallest of Mr Holt's specimens were got in two of the deepest of his trawls. To this list, we may add the young female (of 20 cm.) already mentioned as having been taken by the *Goldseeker* in July 1913, in deep water, 80 or 90 miles N.E. of Shetland.

So far, then, as the Western or Atlantic area is concerned, it would appear that both the eggs and young of this fish occur towards the lowest limits of the known depths to which the species descends. This is in accord with Dr Günther's opinion, who in his *Challenger* Report expressed his belief that Chimæra "is a deep-sea fish, and one which propagates its species in deep water"; and this view he maintained, and held to be confirmed, in a later paper, when he was describing the egg from the *Flying Fox*.

But in addition to what we have already seen and discussed, we know a good many other facts concerning Chimæra's habits from various Scandinavian writers; and what they tell us of its seasonal distribution and reproduction off the Norwegian coast is very important. According to Grieg, Gunner's ovarian egg was found in March: Lilljeborg found two, nearly ripe, in a fish caught in February: Malm got others in May and June. Grieg got two well-developed

eggs in December 1893, at Strudshavn, from a fish caught in only 30 fathoms; and he also records a ripe egg laid by a Chimæra after its capture by line in the Herlöfjord, in 200 to 300 fathoms, in August 1897. Thus, as Grieg says, spawning is seen to continue for many months: and in some cases, at least, it takes place in quite shallow water. At times the fish go far up the Norwegian fjords, and Grieg tells of the capture of a young one at Odda, in February 1896.

In general, as regards the habits of Chimæra off the Norwegian coast, Grieg came to the conclusion: (1) that it moves from deep to shallow water towards the close of the year, being found in shallow waters of 40 fathoms, or even 20 fathoms in winter, and migrating slowly into deep water, of 100 to 200 fathoms, in spring and summer; and (2) that spawning takes place in winter and spring, at least it commences then but may continue longer. The fact that Chimæra resorts to the Norwegian coastal waters in winter is, so far, in complete harmony with our Aberdeen observations; for we have seen that it is towards the Norwegian side that we find the fish about December or January, after which months they seem to wander westward and oceanwards. But the whole history of the fish, so far as we can decipher it, seems to be a complicated one, and not to be summed up in a word.

In the case of some fishes, such as the Hake, we have so definite a migration, along so extended a route, that we find the fish on some one area in abundance at one season (and that a comparatively short one); and then, when the shoals have passed on, we have them again in some other adjacent or connected area. To some extent we seem to see the same thing in Chimæra, in its route (in spring and summer) westwards along the northern border of the North Sea; though even here we are in all probability dealing with but a fringe of the migrating shoals, the bulk of the fish being outside the 100-fathom line, and beyond our reach. But all the while, Chimæra is present in the Atlantic waters, and we cannot suppose, therefore, that we are dealing with one general migration of the entire stock. Moreover, while the Norwegian Chimæræ are found to breed in shallow water, we

have no evidence whatsoever that off the W. of Scotland or of Ireland they do anything of the kind, save only that it is possible (and even perhaps indicated) that they go in the course of the season from one considerable depth to a yet greater depth. If they at any time or season frequented waters off our own coast as shallow, or nearly as shallow, as those they resort to in Norway, the fact would certainly have been discovered long ago.

Considering the long-protracted period of spawning, we cannot say that their migration is directly (or at least obviously) connected with this process: nor have we any evidence whatsoever by which to correlate their migrations (as has been sometimes done) with those of the Herring, or to draw the conclusion that they are following the shoals. I am somewhat disposed to think that they are influenced by temperature; that they show a partiality for cold or cool water; and that while, in general, they find it in the deeper waters outside the continental shelf, so also they find it in winter, but then only, in the shallow coastal waters of Norway.

Professor Meek tells us, in his recent book on the *Migration of Fishes*, that "during the winter *Chimæra* [*monstrosa*] leads a bathypelagic life, at a depth of some 500 fathoms in the North Atlantic," and that "in the spring and early summer a general migration takes place to continental waters." These, and also certain other parts of Professor Meek's account, are by no means in accord with the conclusions to which we have been led, which conclusions we may now attempt to summarise:—

(1). Chimæra is found in Norway in shallow water in winter-time, when it spawns, or at least commences to spawn. It is likewise found in winter and spring in the north-easterly parts of the North Sea, and though it is not known to spawn there, that negative evidence is of little or no value, for its eggs are not likely to attract the notice of our fishermen.

(2). In Norway it migrates slowly into deeper water in the spring and summer; and in like manner its captures in the North Sea indicate a movement westwards, so that it is

found in the neighbourhood of the Shetlands from about March to May.

(3). Within our Scottish trawling area, approximately bounded by the 100-fathom line, its habitat is confined to a northerly belt, running from north of the Great Fisher Bank, parallel to the Norwegian Rift, and round by the Shetlands to the W. of Scotland and the Outer Hebrides; in which last region it occurs about the month of September.

(4). In Norway, besides its shallow-water spawning grounds, it is also known to spawn in the deeper waters, where the spawning season is known to continue at least till August. Furthermore, it is known to breed in deep water between the Faeroes and the Hebrides, and again off the S.W. of Ireland, in which regions its eggs have been obtained in July and November. How much earlier they may have been laid we do not know.

(5). Young examples (in one case very recently hatched) have been found in deep water N.E. of the Shetlands, in the Faeroe Channel, off the S.W. of Ireland, and in the Bay of Biscay.

(6). Off the S.W. of Ireland it has been taken most abundantly in May. Its captures in summer and autumn have been few; but there are indications of its resort to still deeper waters in August and September.

(7). From its occurrence more or less all the year round off the S.W. of Ireland (and probably also off the Spanish coast), we are precluded from supposing that the various localities where it has been found lie on one continuous and regular route of migration. We cannot correlate satisfactorily what we know of it in Norway, in the northern North Sea and off the Hebrides, with what we know of it in the Bay of Biscay, the S.W. of Ireland and the Faeroe Channel. It seems, on the whole, probable that in its more southern and more western habitats its habits are different from those in the North; that it is here confined to deeper waters (seldom less than 100 or even 200 fathoms); but that it tends to resort periodically to still deeper parts of the ocean (of 500 to 600 fathoms or more), and that it is in these that, in this portion of the range of the species, it chiefly spawns.

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Gulls devouring Turnips.—This phase of feeding has been well known on the Aberdeenshire coasts for over a dozen years, and was recorded by the late George Sim, A.L.S., Mr A. Mackie, M.A., and others. The birds eat the pulp of turnips, scooping out large holes in the bulbs, and after apparently absorbing the nutriment contained, eject masses of soft stringy substance. As noted, this occurs in hard weather.—A. Macdonald, Durris School, by Aberdeen.

I was interested to read the note in the *Naturalist* for May regarding Black-headed and Common Gulls eating turnips. In the Orkney Islands I have frequently noticed the Herring Gull resort to the same food, and further, on walking along the shore and coming to places where the Gulls are in the habit of sitting, I have frequently, in fact hundreds of times, found small heaps of disgorged turnips. Evidently these did not agree with them, as they were disgorged raw and undigested, almost as hard as when picked.

I remember a former principal keeper with whom I served, Mr John Tulloch, father of the late William Tulloch, telling me twenty-eight years ago that when he was at North Ronaldshay, 1878 to 1888, he reported this fact to the late Mr Harvie-Brown, viz., that the Gulls were flocking to the turnip fields and eating the turnips. Mr Harvie-Brown did not enter this note in his report as received, but put it that the Gulls were going among the turnips picking worms. This note could possibly still be found in some of Mr Harvie-Brown's reports. The time, as I have noted above, was somewhere between 1878 and 1888. I had it from Mr Tulloch verbally, but remember it quite distinctly.—John R. Laurence, Davaar Lighthouse, Campbeltown.

Stock-dove in Aberdeenshire. — When Sim wrote his "Fauna of Dee" in 1903, the Stock-dove was confined in Aberdeenshire to a small area of sandy coast, with St Fergus, where it had appeared in 1890 or 1891, as a centre, and extending on one side to the Links of Mennie and on the other to the "black bar," a stretch of sand dunes between Loch of Strathbeg and the sea. Sim rejected the suggestions that the "Rock-doves" reported as nesting beside the rivulets of the Coreen Hills in the "eighties" were really Stock-doves. Since 1903 it appears to have extended its range inland as well as along the coast, for, in addition to the Deeside extension to Banchory-Ternan in 1907 recorded by Mr Macdonald, a pair were found this summer on Donside, nesting in a rabbit's burrow on his farm, by Mr Rennie of Wester Fintray, near Kintore.—Thomas Tait, Broomend, Inverurie.

PORCELLIO RATZEBURGII, A WOODLOUSE NEW TO THE SCOTTISH FAUNA.

By WALTER E. COLLINGE, D.Sc., F.L.S., Carnegie Fellow, and Research Fellow of the University of St Andrews.

SINCE the issue of the "Check-List of British Woodlice"[1] I have continued to receive examples of these crustacea from all parts of Scotland. As a result *Porcellio lævis*, Latr., and *P. rathkii*, Brandt, have been added to the Scottish fauna, and I have now the pleasure of placing on record two localities for *P. ratzeburgii*, Brandt, thus completing the list of the genus *Porcellio*, all six species having now been recorded.

The first examples were received from Miss Æ. J. Jardine, from Helensburgh, Dumbartonshire, who also sends specimens of *Philoscia muscorum* (Scop.), *Porcellio dilatatus*, Br., *Porcellionides pruinosus* (Br.), and *Armadillidium vulgare* (Latr.). Miss Jardine also very kindly sent me a large collection of living examples of tiny, white, newly hatched *P. rathkii*. At first I was doubtful of the species, but after a moult or two these were seen to be referable to *P. rathkii*, and I was enabled from these specimens to establish a very interesting point, viz., that the flagellum of the antenna in the young examples is exactly like that found in the adult of *P. ratzeburgii*, but after a few weeks the proximal joint increases in size. I mention this fact as it seems to me very risky to identify immature specimens as *P. ratzeburgii*.

For the second record I am indebted to the kindness of Mr Magnus Spence of Deerness, Orkney, who forwarded a collection of Porcellios, amongst which there were numerous examples of *P. rathkii*, and a single adult specimen of *P. ratzeburgii*.

I have carefully compared this latter with examples in the Natural History Museum of University College, Dundee, received from the distinguished Parisian Isopodist, M.

[1] *Scot. Nat.*, 1917, pp. 111-116.

Adrien Dollfus, from the Tyrol, with which it agrees in all structural characters, only differing slightly in the colour markings. I am indebted to the kindness of Professor D'Arcy Thompson, F.R.S., for the loan of these and many other continental species.

Hitherto the distribution in the British Isles of this species has been as follows:—Essex, 1898. This record rests upon the identification of Canon Norman, who examined specimens received from Mr W. M. Webb, and states: "They were only young specimens, but seem clearly referable to *P. ratzeburgii*."[1] Personally, I regard the record as a doubtful one. In 1912[2] I received this Woodlouse from near King's Norton, Worcestershire, and in 1917[3] from Darwen, Lancashire. Examples received from St Helier, Jersey, in 1913, which I then regarded as referable to this species, I have, in the light of further knowledge, re-examined, and now consider them to be immature examples of *P. rathkii*. Finally, I have quite recently received three not quite fully grown specimens from Mr J. Williams Vaughan, which were collected at Tenby, Pembrokeshire.

To anyone not acquainted with the continental species of this genus, *P. ratzeburgii* is a most difficult one to identify, but the striking difference in the length of the proximal joint of the flagellum of the antenna, which is only about half of that of the distal joint, at once serves to differentiate it. The almost semicircular median cephalic lobe is also a well-marked character, but this is frequently approached by specimens which are undoubtedly referable to *P. rathkii*. Further, it may be pointed out that the lateral cephalic lobes of *P. ratzeburgii* are always narrowly rounded at the tip and slope inwardly, whereas in *P. rathkii* they are more truncate terminally. This character has been very accurately figured by Carl,[4] who, however, minimises the median lobe of the latter species.

[1] *Ann. Mag. Nat. Hist.*, 1899 (s. 7), vol. iii.
[2] *Journ. Econ. Biol.*, 1913, vol. viii., p. 17.
[3] *Lanc. and Ches. Nat.*, 1917, p. 307.
[4] *Monog. Schweiz. Isopoden*, 1908, t.v., fig. 120, 121.

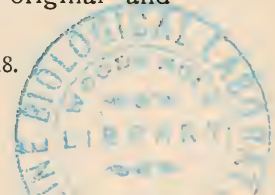
A BIBLIOGRAPHY OF BRITISH ORNITHOLOGY, PARTS I. to VI., 1916-17. By W. H. MULLENS and H. KIRKE SWANN.

THIS ambitious work, the first part of which was published on 20th June 1916, has now been completed, and, as we said in a previous notice,[1] is one which will be indispensable to all public libraries and to every student of local ornithology or bibliography.

The authors acknowledge that in a work of this character there must be some slips and omissions; but he must be indeed a hypercritical reviewer who has anything but praise for the result of the labours of Messrs Mullens and Kirke Swann. As an indication of the task which the authors have so conscientiously fulfilled, it may be mentioned that upwards of 770 authors and close on 4000 publications are dealt with in the book, which runs to over 700 pages. A notable feature is that pp. 675-691 of Addenda and Corrigenda are printed on one side of the paper only, so as to allow of their being cut up, in order that the various alterations may be inserted in the appropriate places in the book.

Although the work may appear to some to be written somewhat unevenly—many details being given about certain books of small account, and little about others of which more information would have been welcome—it will always rank as the standard work on a hitherto obscure subject. We have said that the work has been completed, but we eagerly look forward to the supplementary *Geographical Bibliography*, which we presume will shortly be published, as promised when issuing Part II. of the present work. This "County Index"—which is to include not only the short titles of the books relating to local avifaunas but also all articles and notes in periodicals, by every writer, provided they are of a faunistic nature—will be an essential addendum to a work which may be summarised as original and comprehensive.—H. S. G.

[1] *The Scottish Naturalist*, 1916, pp. 247-248.



Sperm Whale in the Moray Firth.—We have received from a correspondent copies of Caithness newspapers recording the landing of a Sperm Whale on the Caithness coast near Latheron, in the latter half of May. The whale was towed ashore by an Admiralty patrol boat, which found it floating in the Moray Firth. It may have been killed by striking a submarine mine, but in what locality is uncertain, as it had evidently been dead for some time, and may have drifted a considerable distance. The Whale was found to be 59 ft. 4 ins. long. Sperm Whales, almost invariably aged bulls, are occasionally met with off the western coast, and every year formed a small proportion of the catch of the whaling stations on Harris and the Shetlands.

Rediscovery of a Scottish species of Phoronis.—As long ago as 1856 Dr Strethill Wright described a new genus of Polyzoon-like animals, *Phoronis*, including a species, *P. ovalis*, which was found upon an oyster-shell dredged near Inchkeith in the Firth of Forth. Since that time this species has never again been recorded, and doubt has been thrown on its distinctness. Now, however, Dr S. F. Harmer has rediscovered *P. ovalis* on a shell from the Northumberland coast, and the difficulty of perceiving the gregarious colony of minute polyps, which was entirely buried in the substance of the shell, leads him to surmise that the species is probably more common than has been imagined, and that careful search may reveal its presence along a great part of our eastern coast. Dr Harmer gives some interesting information about the habit and structure of this rare *Phoronis*, and particularly describes and illustrates the mode by which the colonies are formed by the division of individual polyps.[1]

Limax cinereo-niger in Aberdeenshire South.—I am indebted to Miss J. Gowan for a large number of *Limax cinereo-niger* var. *maura* and one v. *luctuosa*, from the pine-woods of the Fangle Glen close to Aboyne, taken 28th June 1917—at about 500 feet altitude. They were in company with abundance of fine *Arion ater* type and var. *aterrima*. This is our first authentication of the *Limax* for Aberdeen South.—W. Denison Roebuck, 259 Hyde Park Road, Leeds.

[1] *Quart. Journ. Micr. Sci.*, vol. lxii., 1917, pp. 115-148.

(*Authors are responsible for nomenclature used.*)

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WILD LIFE IN A WEST HIGHLAND DEER FOREST

By William Eagle Clarke, LL.D.

Among the more promising haunts for the observation of wild life in the British Isles, the Highland Deer Forest must be awarded a foremost place. It is true that animal life in a Deer Forest is very far from being abundant, for within its limits are miles and miles of desolation suited only to the requirements and mode of life of a few special species. Herein lies the main charm the Deer Forest affords for the naturalist, for these characteristic inhabitants in feather and fur are not to be observed elsewhere, and include some of the most attractive and distinctive members of our fauna—among them the remnants of the few existing forms which possess a romantic interest. In addition, the very wildness of the haunts of these Forest animals adds not a little to the zest of their observance.

Botanists will, no doubt rightly, claim that its endemic flora is equally interesting. In particular, the Deer Forest offers to botanists, as to zoologists, a field for the investigation of several interesting problems associated with plant

and animal distribution and economy, in which the influence of altitude in relation to climate plays an important part.

These mountainous tracts still retain much of their primitive wildness, mainly due, it must be said, to the fact that it is beyond the power of man to effect any material change in the barrenness imposed by their physical conditions; hence nature to a considerable extent holds sway over vast areas in Northern Britain. In addition to the seclusion, which is characteristic of these fastnesses, another factor favours their animal life, namely, that the measures which are necessary for the preservation of the Deer are also conducive to the welfare of the other forms of the *feræ naturæ* of the forest. It is a matter for congratulation that such retreats exist, now that so many once common animals have become decidedly scarce or greatly restricted in their range through the direct interference of man. To these persecuted members of our fauna, Deer Forests may be regarded in the light of nature reserves. It is not too much to claim that we owe it to such preserves that the Golden Eagle, the chief ornament of our avifauna, still survives to gladden the heart of nature-lovers.

Such is a slight sketch of some of the attractions afforded to zoologists by a Highland Deer Forest, with an indication of the important part it plays in the conservation of a number of the rarer and more interesting members of our native fauna.

The observations upon which the present contribution is based were made in the Corrour Forest in West Inverness-shire, where for several years past it has been my good fortune to spend some delightful vacations, amid scenes which have always held a special attraction for me. The data obtained relate chiefly to mammals and birds, but the occurrences of other forms of animal life are recorded when such are associated with a high altitudinal range.

The Corrour Forest is of great extent and lies amid some of the wildest mountain country in Great Britain. Its boundaries range from the north-eastern limit of Argyll (the Blackwater) on the south to the River Spean on the north; and from the Ciaran Water and Loch and River

Treig on the west to the north-western limit of Perthshire and the Benalder Forest on the east. Some idea of its rugged nature may be gleaned from the fact that within this domain there are about 2700 acres, including ten mountain summits, over 3000 feet above sea-level, and a vast area over 2000 feet. In addition there are several fine lochs, three rivers, and what is probably the highest wood composed of deciduous trees to be found in our islands. This combination of characteristics renders the Forest exceptionally advantageous for the study of the altitudinal ranges reached by various animals, and special attention has been paid to this phase of animal distribution.

For the purposes of this zoological survey, the Forest may be conveniently subdivided into the following zonal areas:— I. Highest or Alpine Zone; II. Middle or Subalpine Zone; and III. Lowest or Valley Zone.

I. The Alpine Zone, comprising about one-half of the Forest, is entirely a mountain-region. It includes all the ground over 2000 feet, and reaches its maximum altitude of 3611 feet at the summit of Bheinn Ebhinn. Here are rugged crags, precipitous escarpments, arid stone-scattered plateaux, rough mountain sides clad in heather and grass, secluded corries flanked by screes or boulder-strewn ground, a number of hill-lochans, and the upper waters of innumerable burns.

This zone is the summer home of the Red Deer; the eyries of the *Golden Eagle[1] and the nesting haunts of the *Raven, *Ptarmigan, and of the few Golden Plover found in the Forest are entirely confined to it, and these are to be regarded as its characteristic birds. In addition, however, to these, there are a number of species of mammals and birds of wider distribution in the Forest, which also find their maximum altitudinal range in the Alpine Zone. They include the Fox, Stoat, Mountain-Hare, Field-Vole, and Black Water-Vole among mammals; with the Ring-Ouzel, *Hooded Crow, Meadow-Pipit, Wheatear, *Mallard, Teal, *Red Grouse,

[1] The birds marked with an asterisk (*) throughout this paper are resident species; the rest are summer visitors, unless otherwise specified.

*Waterhen, and Curlew, as nesting birds; and the Snow-Bunting as an autumn and winter visitor.

When, however, the 3000 feet contour line is crossed we find that the species haunting this, the very highest ground of the Forest, are comparatively few, and comprise only the Fox, Stoat, Mountain-Hare, Field-Vole, Red Deer, Wheatear, Meadow-Pipit, and *Ptarmigan.[1]

II. THE SUBALPINE ZONE comprises the area lying between the 2000 and 1000 feet contour lines. It consists of fells; mountain sides; expansive moorlands; rough marshy and peaty flats, clothed with a mixture of heather and grass, and dotted with a number of shallow lochans; and extensive woodlands. Here, too, is the beauteous Loch Ossian (1269 feet); also Lochs Ghuilbin (1200 feet), Blackwater (1025 feet), and na Lap (1930 feet). At the lower end and on the margin of Loch Ossian, amid delightful surroundings, is the Lodge, completed in 1897, with its attractive gardens and shrubberies, the latter now the home of a number of bird-colonists induced to settle there, including the *Blackbird, *Redbreast, *Hedge-Accentor, *House-Sparrow, and possibly some *Chaffinches. This belt, with its remarkable variety of congenial haunts, and its enticing conditions generally, is naturally the main stronghold of animal life in the Forest, and no fewer than eighty-six species of mammals and birds have been observed within its boundaries.

The mammals which have their retreats here include, besides all those already mentioned for the Alpine Zone, the Pipistrelle Bat, Mole, Common Shrew, Hedgehog (one record only), Weasel, Bank-Vole, Long-tailed Field Mouse, Rabbit, and Roe-Deer. The Red Deer descends to it for winter quarters.

Birds are specially abundant and interesting: on the fells and higher ground are to be found the *Hooded Crow, Meadow-Pipit, Ring-Ouzel, Wheatear, *Tawny Owl, *Pere-

[1] Precise data relating to the altitudinal range, faunal status, and other information relating to these and the rest of the species to be presently treated of for other zones will be furnished in the list which will form the final section of this contribution.

grine Falcon, Kestrel, and Curlew; on the moorland or marshy ground, the Skylark (rare), Whinchat, *Red Grouse, Merlin, Lapwing, Snipe, Dunlin, and Greenshank. Among the more or less aquatic species are the Reed-Bunting, Pied Wagtail, *Dipper, *Heron, *Mallard, Teal, *Waterhen, Common Sandpiper, Black-throated Diver, and Little Grebe. All of these are nesting species.

The woods deserve special notice. Not only do they contribute greatly to the picturesqueness of their romantic surroundings, but their bird-life adds an unique feature to the area, for they are the home of a number of forms that one would not expect to find in the heart of a Highland Deer Forest. These sylvan retreats, with their wealth of insect-life, constitute a veritable oasis amid the wilderness of mountains and moorlands, and are sought each spring by numerous warblers and other delicate immigrants—some of which have passed the winter far off in the tropics of Africa, others in the basin of the Mediterranean, or in south-western Europe. In addition they are the congenial homes of many familiar resident species. The woodlands clothe the hill-slopes which fringe the lower half of Loch Ossian, and cover an area of some 500 acres, and rise from the water's edge at 1269 feet to a height of 1550 and 1700 feet on the north and south respectively. Foremost in interest among these attractive haunts is a natural unenclosed birch wood, covering nearly 100 acres, which adorns a steep face on the south side of the loch. Birch forms the staple of its growth, but there is besides a sprinkling of rowans, alders, willows, and bird-cherries. Many of the trees are of great age, indeed venerable patriarchs decked with shaggy beards composed of the lichen *Usnea barbata*. There is a considerable amount of low undergrowth composed of blaeberry and an abundance of ferns; while in the more open portions of the wood there is much heather, amid which a few Red Grouse rear their young. The trees thin out at 1600 feet, but groups, more or less isolated, are found up to 1700 feet. This wood holds, it is believed, the unique status of being the highest patch of deciduous forest in Scotland, perhaps in Britain; hence a number of the birds frequenting it probably reach here the

maximum of their altitudinal nesting range in our islands. In the spring of 1917 I thoroughly explored this wood in order to ascertain the greatest height at which each species was breeding.

The feathered summer visitors seeking this wood are the Song-Thrush, Redbreast, Redstart, Willow-Warbler, Wood-Warbler, Tree-Pipit, Spotted Flycatcher, Cuckoo, Sparrow-Hawk, and Woodcock. The Chaffinch is also chiefly a summer bird. The resident species are the *Hooded Crow, *Great Titmouse, *Blue Titmouse, *Cole Titmouse, *Wren, *Creeper, *Chaffinch (less numerous in winter), *Lesser Redpoll, *Bullfinch, *Long-eared Owl, *Tawny Owl, *Red Grouse, and *Black Grouse.

The rest of the wooded area, some 400 acres in extent, may be described as plantations at various stages of growth. These have been systematically planted during the past twenty-five years, and consist mainly of Conifers, with here and there small plantings of birch, rowans, sycamores, Norway maple, and ash. Although pine woods are as a rule less interesting from the zoologist's point of view, since with few occasional exceptions they are less suited to the requirements of animal life generally, to the arboriculturalist the Corrour plantations are of extreme interest and importance. Sir John Stirling Maxwell is an expert in all that relates to afforestation, and the experimental work he has long been engaged in at Corrour is of great national importance, since its main object is to discover if (and what) trees will flourish on rough land which is incapable of other productivity. To this end he has planted numerous Conifers from widely scattered habitats in foreign lands.

The birds which have taken up their abode in these plantations are the Song-Thrush, *Blackbird, Willow-Warbler, *Hedge-Accentor, *Wren, *Chaffinch, *Lesser Redpoll, and *Bullfinch, but the numbers of the colonists are, as yet, few. In due time, no doubt, other birds will become colonists, such as the Crossbill and Goldcrest, for which pine woods have special attractions; for the first-mentioned species, indeed, they are essential.

Two birds, both of them summer visitors to this portion

of the Forest, remain to be mentioned, namely, the House-Martin and the Corncrake. The Martin attempts to rear its young almost annually at the buildings at the railway siding, or at the cottages of the surface-men, but without success, owing to the fact that the nests when completed do not long hold together. This singular circumstance may possibly be due to an insufficiency of clay in the material used in their structure, the only mud available being chiefly of a sandy nature, owing to its being largely composed of disintegrated granite. The Corncrake is represented by a single pair which returns almost annually to a croft of grassland at the foot of Loch Ossian to rear their young.

III. Valley Zone.—This zone lies between the 1000 feet contour and Loch Treig (784 feet) on the west, and the slopes above the River Spean (800 feet) on the north. It is a small area outside the stalking ground, but includes the rugged mountain slopes flanking the east side of Loch Treig, a limited portion of the valleys and streams at the head of that fine wild sheet of water, and a belt of rough ground above the Spean. It affords a domicile for the Hedgehog and nesting haunts for a small number of birds not found elsewhere on the Corrour Estate, namely, the Stonechat, Grey Wagtail, Twite, Red-breasted Merganser, and the *Partridge. With the exception of the last-named, these are all summer visitors. Since both of them are more or less subalpine species, one would expect to find the Grey Wagtail and Twite as nesting birds in the middle zone, but as yet they have not come under notice there. The Red-breasted Merganser seems to reach its maximum altitudinal range as a breeding species at Loch Treig, where I have observed it and its brood annually for several years. As a visitor of rare occurrence in the Highlands, the occurrence of a male Lesser Whitethroat among trees at the head of Loch Treig on the 13th of June 1915 is worthy of mention. The Redshank puts in an occasional appearance during the summer, but its visits are of very short duration.

Migration.—The Subalpine Zone is visited during the spring and autumn by a number of birds which are not

inhabitants of the Forest. This fact clearly indicates that the area is traversed by birds on passage to and from seasonal haunts beyond its limits. The course of these migrants appears in autumn to be between the Spean via the Treig and Ghulbinn and Ossian valleys to probably the upper portions of the Tay and Forth basins, and thence, in part perhaps, towards the east coast. In spring a reverse course is followed. Our knowledge, however, on this interesting subject is at present only slight, but a series of observations made during the main periods of the great seasonal movements would, no doubt, yield interesting results. The migrants which have so far come under notice, while traversing the Forest, are the Starling, Skylark, Fieldfare, House-Martin, Swallow, Swift, and Oystercatcher, but others whose identity has not been established have been reported.

The few dates available relating to the arrival and departure of summer birds will be given, under their respective species, in the list which forms the second part of this contribution.

CASUAL VISITORS.—The Pheasant (one record), Goosander, Cormorant, Black-headed Gull, Common Gull, Herring Gull, and Lesser Black-backed Gull appear more or less frequently as visitors to the Forest. The Common Gull may breed on the islands in the Blackwater Loch, where its behaviour has led me to suspect that it had young not far off.

WINTER.—There still remains for consideration the winter aspects of the animal life of the Forest. At this season the climatic conditions are of a very severe type, and these, coupled with the general dearth that also prevails, naturally exercise a considerable influence on the distribution of life within the Forest's limits, and render the presence of a number of forms impossible. These seasonal changes in the fauna of such an elevated region are of great interest, though little if anything regarding them is on record. In the severe December of 1915 I spent twelve days at the Lodge (1300 feet) for the purpose of ascertaining what these changes were. The whole area was then under snow and low temperatures — usually 25 degrees of frost Fahrenheit

—prevailed. My investigations were chiefly confined to the Subalpine Zone (1000 to 2000 feet)—the chief centre of animal life, and the one where the influence of the season was bound to be the greatest.

The winter fauna of the Alpine Zone (2000 to 3611 feet) is very limited, and is confined to a few species—the Fox, Stoat, Mountain-Hare, and Field-Vole among mammals, and the Raven, Golden Eagle, Peregrine, Snow-Bunting, Ptarmigan, and Red Grouse among birds: some of these, however, are wanderers, since they seek their food over other, and to some degree more favoured, areas of the Forest. The Red Deer descends to the lower zones and is not found above 2000 feet. In the Subalpine Zone all the mammals found in the Forest are present in winter, including the Roe-Deer. The greatest change was obvious among those pre-eminently mobile creatures, the birds; but even among these I found the number and variety of forms braving the cold season greater than I expected. Certain species, however, which normally pass the winter in climatically more favoured parts of our islands were absent, having winged their way at the end of the nesting season to those more genial quarters; among them the Song-Thrushes, the woodland Redbreasts, the few Skylarks, the Meadow-Pipits, Pied Wagtails, most of the Chaffinches, including *all* the females, the Sparrow-Hawks, Merlins, Kestrels, some of the Peregrines, and the Woodcocks. On the other hand, cock Chaffinches, House-Sparrows, Blackbirds, Redbreasts, and Hedge-Accentors remained and frequented the gardens (1300 feet); Dippers, one or two Herons, and a number of Mallards were to be seen by the unfrozen running waters of the River Ossian and its tributary burns; while several Waterhens haunted the margins of frozen ditches.

Winter bird-life was most numerously represented in the old birch wood, where the all-important food resources were less affected than elsewhere. Here the seeds of the birch catkins and the insects[1] they contained afforded food for Redpolls, Bullfinches, and Blue and Great Titmice. The Tree-Creepers and the Cole Titmouse found spiders and

[1] Probably the larvæ of the Birch Gall-Fly (*Cecidomyia betulæ*).

other *bonnes bouches* hidden in the recesses of the trunks of the trees; while the Wrens were busy gleaners among the varied undergrowth. Here, too, were Long-eared and Tawny Owls, a few Grey Crows, and Black and Red Grouse.

An important item, though a negative one, remains to be mentioned, namely, the absence of representatives of that numerous section of the British avifauna, the winter visitors —birds mainly of northern and arctic origin which annually seek our isles as cold weather retreats. Perhaps, however, some of the Snow-Buntings observed belonged to this category, while others may have been emigrants from the neighbouring mountains. The Fieldfare may be regarded as a partial winter visitant, since some of them arrive in the autumn and remain until the advent of the first serious snowstorm of the season. A Goosander, an adult male, spent the 3rd of December on the open water of Loch Ossian, and a single Teal was seen. Each fall of snow experienced during my winter sojourn brought in its train a few casual visitors, evidently fleeing south in the hope of finding more genial conditions. These refugees were a few Starlings, a Greenfinch, and a Skylark from agrarian areas beyond the Forest.

I cannot conclude the first instalment of this article without duly acknowledging my deep indebtedness to Sir John Stirling Maxwell, Bart., for the privileges and facilities very graciously granted to enable me to carry out these zoological studies. I have also to acknowledge the assistance received from Mr Duncan Ferguson, who has furnished me with much useful information based upon his long experience as head keeper at Corrour.

(*To be continued.*)

Hyalinia lucida in Main Argyll.—Mr Wm. Rennie has sent an addition to the Main Argyll list, in an example of *Hyalinia lucida* from Kirn, where it is fairly common under timber in one spot.—W. Denison Roebuck, 259 Hyde Park Road, Leeds.

AUTUMN DISPLAYS IN OUR BRITISH BIRDS.

By Leonora Jeffrey Rintoul and Evelyn V. Baxter.

Much has been written of the spring displays of many of our British birds, and exact descriptions have been penned of their courting antics, but we have been able to find very little data respecting the displays which frequently take place in autumn and winter. Mr E. Selous, in his book *Bird-Watching*, gives a vivid account of the autumn antics of the Stone Curlew; these are, he states, quite different from the courting antics that take place in spring, and he considers that this species has an autumn or social display in contradistinction to its spring or sexual one (p. 14 *et seq.*). On p. 86 of the same work he gives a description of a winter display by Dabchicks, this being, however, a milder form of what takes place in spring. Mr Elliot Howard, in his *British Warblers*, gives instances of display by Sedge and Grasshopper Warblers in July; these he believes to be preliminaries to a second nest, and so they fall into a different category from those we propose to describe. Mr H. Wormald (*British Birds* (mag.), vol. iv., p. 7) says: "One finds this autumn display in many birds; for instance, Blackcock repair to their playing grounds and go through a half-hearted spring 'show' so soon as they have finished the moult. One often hears cock Pheasants utter their spring-call followed by the characteristic whirr of their wings in November. Snipe drum freely during this month, just before dark, though I have never heard a Snipe drumming in the daytime during November." In *The Scottish Naturalist*, 1912, p. 116, Mr G. E. Brock describes the display of the Goosander, which takes place from November onwards. In view of the fact that so little seems to have been written on this subject, we think it may be worth putting on record what we have ourselves seen.

The following are notes on the instances of autumn and winter displays that have come under our personal observation; in cases where we have seen the same species displaying several times we have instanced the most striking example fully, and merely referred to the others. We have only once seen the Hoodie displaying at an unseasonable time. This was in Largo Bay on 23rd December 1903, and our note runs:—A Hoodie rose up into the air 4 or 5 yards, coming down again on the place whence it rose. This it did at least thirty to forty times while we were watching it, apparently for the edification of a bird of the same species, which was sitting on the ground. At last a third Hoodie came along, flew up into the air and fought the first one. This combat continued for some time. When it was over the first bird proceeded to fly up and down again as it did before. On 21st October of the same year two Rooks in a field near Lindores stood side by side close together, gently touching bills now and again, a much less pronounced display but one recalling faintly some phases of the courting antics.

On the Isle of May on 25th September 1907 and 15th September 1908 and 1909, we watched Meadow-pipits doing their flight in which they descend like a tiny parachute, singing as they come. A similar display was observed in the Rock-pipit at the same locality on 17th September and 15th October 1910. We have frequently watched this flight in spring, and the above instances differed in no visible way from the vernal manifestations.

With regard to the Missel-thrush, we have November and December notes referring to behaviour similar to that which takes place in spring. Under 21st November 1910 we have the note in hard frost, "three flying about courting as if it were spring." These birds pair so early that their courting demonstrations are far from uncommon in winter. The autumn displays of our familiar Redbreast must be well known to all our readers, and we merely mention them in passing. On 14th January 1911 a Hedge-sparrow was seen near Largo indulging in a courting performance, shuffling round on the branches, looking intently downwards,

and uttering its note at short intervals; another which was near took little notice of the performance. A good instance of autumn display was seen on 17th November 1912 when a Wren pursued another for some time, then, crouching before it, extended its wings, fanned out its tail which showed very ruddy, and uttered its song repeatedly. This was repeated several times.

Duck seem much given to autumn display, though, as far as we have seen, it is lacking in fervour compared to the spring antics. On 25th October 1905 we watched Mallard near Largo; the drakes flirted up their tails and dipped their beaks in the water, then they sat up on their tails and tucked their beaks close into the breast; after this they slowly elevated their heads, elongating the body at the same time, and uttered a deep sounding, guttural "goo." They then swam with their heads stretched out nearly flat on the water, while the ducks took no interest or part in these movements. This display was again seen on 11th November 1906. Mr Wormald says (*loc. cit.*): "Adult Mallards commence 'displaying' in October so soon as their winter-plumage is complete, and I have seen them 'display' when in full eclipse-plumage! Immature drakes begin to 'display' about the same time, even before they are in full winter-dress."

We have frequently seen Eider displaying in October and once in January; in all cases these were modified forms of the courting antics which we have often watched in spring. The following is a typical instance:—1st October 1908, Isle of May. "A very large flock of Eider; birds had come in since yesterday. The new arrivals included several full-plumaged males, and a lot of grunting and cooing was going on. The males threw back their heads, elevated their beaks, and cooed vigorously; one male kept turning his head first to one side and then to the other for quite a long time. The grunting seemed to be done with the head held down, only the cooing note being uttered with elevated bill. Some of the males had lovely blush-pink on their breasts, which was clearly seen when the display was taking place." The ducks took no part in this performance, and we never heard the

note which the duck Eider utters during the spring courting antic.

On 1st November 1908 Velvet Scoter were seen displaying in Largo Bay; they repeatedly stretched their heads up stiffly, beaks pointing to the sky. This species and Black Scoter were also observed displaying and chasing one another excitedly in Largo Bay on 26th January 1915; but on both occasions it was only a faint reflection of what takes place later in spring. Merganser begin displaying very early in the year; we have frequently seen them doing courting antics in January. A typical note runs as follows:— 27th January 1910, in Largo Bay in hard frost. "Merganser displaying like mad, crests expanded, and every bit of white in their plumage showing, ducking and chasing each other as if it were a balmy spring day." These displays naturally become more pronounced and more frequent as the spring advances.

Gannets, too, indulge in autumn antics; we have twice seen this on the Bass, on 9th September 1907 and 18th October 1910. On the latter date some adults were bowing their heads and cocking their tails, wings half-extended, then waggling their heads from side to side, anon standing with head and neck extended stiffly, beak pointing straight upwards. Instances of this autumn display are also given in Mr Gurney's interesting book, *The Gannet*, p. 378. Cormorants and Shags have a wonderful spring display; this is mildly reproduced in autumn. On 7th October 1916 we saw both species on a rock in Balcomie Bay, bending the head and neck backwards till the beak touched the tail, which was elevated and fanned out; the head and neck were then slowly swung forward as far as the position of the bird would admit, in many cases below the level of the feet. At other times the bill was opened widely and kept so for a considerable space of time. A particularly interesting point about this special instance of autumn display was that several of the birds that were taking part in it were in immature plumage.

In the Wader these autumn displays with which we are dealing are not very uncommon. Oystercatchers are at all times vociferous, and their spring piping note and curious

movements have been fully described (*Bird-Watching*, p. 90). We have seen a modified form of these in autumn and winter. On 19th January 1904, at St Andrews, we saw two go up to each other several times, jump up into the air, breast to breast, with a little flutter, and on alighting, one, or sometimes both, stooped slowly forward till the tip of the beak rested on the mud. They made a shrill, scolding noise as they flew up, and afterwards usually turned round and walked away. There was a good deal of piping going on; a bird would stoop down with the point of its bill on the mud, then turn slowly round and round with its bill as the pivot, piping shrilly all the time. On one occasion two did this simultaneously in front of another, probably a female. A similar display was observed in Largo Bay on 11th November 1903.

On 16th December 1916, near Largo, we saw a Lapwing doing a modified display, rolling to and fro on its breast, its tail pointing skywards, the chestnut under-tail coverts showing most distinctly. In the case of Redshanks we have also seen antics on 25th August 1906 and 13th October 1916, the stately paces and waving wings make of this display one of the prettiest pictures imaginable.

The only instance we have come across among the Laridæ was on 24th August 1909, when in Largo Bay we saw two Greater Black-backed Gulls in full summer plumage, displaying by bowing their heads, then drawing themselves up to their full height with a very stiff action. It is curious how often this very stiff action is a concomitant of courting displays; one sees it in the spring antics of many species, and it was also present in the displays we have just detailed though in a lesser degree, corresponding to the less vigorous character of these.

There are a few points to which we should like to draw special attention. In the cases of autumn display of Eider observed by us, these were performed by newly arrived and freshly moulted males; it must, however, be remembered that this species, Merganser and Scoter (all of which have come directly under our notice), have their principal season of display in spring, when the courting antics are performed

with a vigour and intensity unknown in the fall of the year.

It is a well-known fact that some duck separate into pairs very early, while others of the same species do not do so till later. For instance, one sees Eider, Merganser, etc., going about in pairs as early as January, while, on the other hand, flocks of these species may be observed in April, apparently still unpaired, and doing their courting antics with intense vigour. Possibly the autumn displays are performed by the birds which draw off into pairs thus early.

It is easy to find a cause for the spring displays; they are directly attributable to the awakening of sexual activity which takes place at that season. In the case of these autumn antics, however, explanation is more difficult, possibly a feeling of vigour and well-being following on completion of the moult may be the cause, or excitation may be aroused by rejoining the females after absence from them during the period of moult. On the other hand, the Great-Crested Grebes seen by us displaying on Kilconquhar Loch on 18th August 1916 had not yet begun to moult (*Scot. Nat.*, 1916, p. 264), so it is not always the case that autumn displays take place only after the moult is complete. A special feature in this case was the presence of the young.

Weather seems to have little if any influence in the matter; we have seen birds displaying on mild days and also during the hardest frosts of winter, it cannot therefore be said to be a matter of temperature. Nor is it confined entirely to the adult birds; we have noted above both Cormorants and Shags giving a display while still in immature plumage. It is difficult to draw conclusions, specially where data are limited, and the above are merely tentative suggestions drawn entirely from our own experiences.

Ornithological Nomenclature.—We are glad to observe that the authors of the *Handlist of British Birds* have seen reason to restore the generic names *Hirundo*, *Colymbus*, and *Podiceps* to the Swallows, the Divers, and the Grebes; also that the Red Grouse is awarded full specific rank.

The pity is that these and various other changes were ever made.—Eds.

A RARE HYDRACARID—*LEBERTIA DENSA*, KOEN.

By Wm. Williamson, F.R.S.E.

Since *Lebertia densa* was described by Koenike in 1902 (*Zool. Anz.*, xxv., 611) I have not seen any reference to its distribution other than Harburg, where it was found. Its occurrence at Craigallian Loch, where I took it at an excursion of the Glasgow Microscopical Society in September 1911, extends its recorded distribution and adds another species to the Britannic fauna, bringing the number of our Lebertia species up to eleven.

In 1905 Thor placed *L. densa* provisionally in subgenus *Neolebertia*, but in 1907 he transferred it to subgenus *Mixolebertia*; looking to the fact that Koenike said so little about the palpi, I imagine that Thor had seen the type before he finally placed *L. densa* in subgenus *Mixolebertia*.

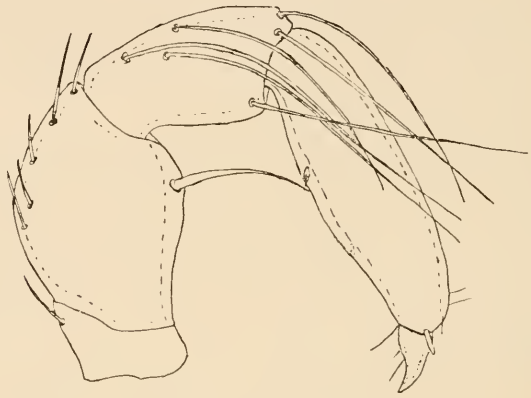
Compared with Thor's critical "Lebertia-studien," appearing from time to time in the *Zoologischer Anzeiger*, Koenike's description is by no means as complete as is desirable in this difficult genus, and is without figures. The following description and figures will, I hope, bring this species into line with Thor's studies of the genus.

The body of *L. densa* is about 1 mm. in length, and in outline tends to be round. The skin is stout and is closely covered with fine pores. As the surface ridges are so fine and so wide apart, the skin might be almost classed as smooth. The gland areas, which are relatively few in number, are reddish brown and strongly chitinised.

The capitulum is about 0·25 mm. in length. Compared with the postero-lateral process, the antero-lateral process is by much the stouter in build. Its outer half is of about equal thickness throughout and ends bluntly. The postero-lateral process is rather more than half the length of the other and curves well round to the sides, ending in a point. The pharynx is relatively broad, with its posterior end

moderately high but very much broadened. The mandible is nearly 0·3 mm. in length.

The palpi are nearly 0·39 mm. in length. The extensor surface of the first segment carries the usual curved spine. The second segment is stout, nearly as thick as the first pair of legs, and has on the inner edge of the extensor surface four or five moderately long bristles. The flexor surface may be straight or slightly bulging in its anterior half. The characteristic long bristle is about as long as the segment and stands well back from the anterior edge. The third

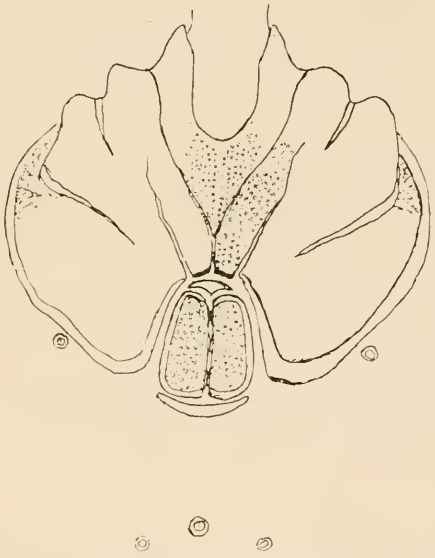


Inner Side of Palpus.

segment has six long bristles on its inner surface; three of these are distal, one being at the flexor edge and two close together at the extensor edge. The other three bristles are in the proximal half of the segment, one being about midway on the extensor edge and one halfway between that and the proximal extremity, while the remaining one lies between these two but more in from the edge. The fourth segment is weakly curved on its flexor and extensor surfaces, and has two hair pores on the flexor surface, equidistant from one another and from the extremities. The posterior hair is short, the anterior one very minute. Towards the distal extremity of the extensor surface there are two short hairs, and round the distal extremity two or three others. At the distal edge of the

inner surface there is a small peg projecting forward. The claws at the end of the fifth segment are small and not conspicuous. The groups of fine pores on the first four segments do not lie close together, but they are evenly distributed over the segments.

The extreme width of the epimera is about 0·90 mm. and the length about 0·75 mm. The whole of the epimeral area is surrounded by an unusually thick edge. The first pair are of the usual type and extend downwards for nearly three-



Epimera and Genital Area.

fourths of the distance between the capitulum and the genital area. The second pair are relatively broad at the posterior end, being a little less than half of the width at the anterior end. The posterior ends do not lie straight across but are sloped anteriorly inwards. The suture from the outer edge extends in for about one-fourth of the length of the epimera, while that from the inner edge is about half the length. The third pair are triangular in shape, the posterior suture extending in for about two-thirds of the length. The fourth pair have their margins conspicuously thickened, and

are weakly emarginate near to the gland pores. The inner posterior corners are more or less truncate.

The legs are without the long hairs which are distinguished by the name of swimming hairs, but at the distal end of the fifth segment of the third and fourth pairs of legs there is a single hair, considered to be the rudiment of a swimming hair. The length of the legs ranges from 0·90 mm. in the first pair to 1·70 mm. in the fourth pair. There does not appear to be any necessity here to lay any stress on the spines occurring on the various segments, beyond the coarsely pectinated one lying at the distal end of the fourth segment of the fourth pair of legs. The claws are slender, with a small lamina and a minute accessory claw.

The genital area extends very little beyond the epimera; each of the valves has from fifteen to twenty hairs along its inner margin. The acetabula are elliptical and do not vary much in length. The chitinous ridges at the anterior and posterior ends are strong and conspicuous.

The anus and the accompanying gland pores are each surrounded by a strong chitinous ring.

The male and larva are unknown, but the nymph has been found and briefly described by Koenike.

Macrosternodesmus palicola, Bröl., in Scotland (Forth).—In December 1912 I sent Mr R. S. Bagnall, amongst other things, a few Myriapods, which I had collected on the Isle of May on the 7th of the previous month. Among them he found an immature female of *Titanosoma jurassicum*, Verhoeff (now stated to be synonymous with Brölemann's *Macrosternodesmus palicola*), a tiny Diplopod which he had then recently added to the British list from the North of England (see *Zoologist* for July 1912). Another Diplopod, *Brachydesmus superus*, Latz., was fairly common on the Isle of May in November and December 1912.—William Evans, Edinburgh.

Acanthis cannabina nesting in Renfrewshire. — The Linnet is well known in Renfrewshire from autumn till early spring. During that period large flocks are met with. As soon as the nesting season comes round the birds mostly disappear. We have known of a district in the eastern division of the county in which it has nested for years. A gamekeeper in this (Kilmacolm) district, who knows the bird well, assures me he has seen an odd nest now and again. This year my son found a nest with five eggs on 20th May. A week later we visited this stretch of gorse and found a brood which had just left the nest. A careful search revealed the empty nest—an exact duplicate of the one containing the eggs. The definite finds are so few that this one is worthy of record.—T. Thornton Mackeith, Kilmacolm, Renfrewshire.

Strange Nesting Site of the Pied Wagtail.—A somewhat strange nesting site of the Pied Wagtail (*Motacilla lugubris*) was brought to view this morning (20th July 1917) at Crathes Station, on the Deeside system, when a number of railway chairs which had been stacked on the embankment for years was removed. The nest had been built between two rows of chairs on the ground, with very little depression to support its sides. It consisted of dried tree-roots and withered grass and other plant stems on the outside, and was lined with rabbits' fur, a few hairs, and one or two feathers. There were four eggs well advanced towards hatching in the nest. An old nest, evidently used in 1916, occupied a similar position half a foot further from the edge of the embankment. Whether the present was the second clutch of eggs in this year's nest was uncertain, but the evidence pointed in that direction.—Alex. Macdonald, Durris.

Swallows in Picardy.—I don't know whether, amongst the numerous "Nature Notes" from France, which no doubt appear in home journals, attention has been drawn to the remarkable abundance of House-martins, Swallows, and in lesser degree, Swifts, in the destroyed villages of Picardy. It is a feature which forces itself on the attention in all the territory evacuated by the Germans in the spring, and in the damaged villages behind the line not entirely levelled with the ground. Here, in P———, House martins in particular swarm to an extraordinary degree. All the houses in the place have at least the upper stories or sides destroyed, with, as a result, an unlimited supply of nesting-sites; in many of these the nests are collected together in large bunches, and the birds go in and out in clouds, while at the present moment (mid-July) the young birds are to be seen sitting about in little rows of thirty

and forty together. Swallows, though not so closely packed together, are also present in extraordinary numbers; and in the evenings Swifts can be counted in hundreds over the bare walls of the old church. I have twice heard French interpreters (acquainted with the district in pre-war days) remark on the great abundance of these birds present this year, and I think it may be taken as a fact that their numbers are greatly in excess of the normal. One cannot but wonder whence this surplus is drawn.—S. E. Brock, Capt., 10th Royal Scots.

Nesting of the Kingfisher within the Glasgow Boundaries.—The nesting of the Kingfisher (*Alcedo ispida*) within the bounds of the City of Glasgow may be deemed worth recording. This year and last year a pair have reared their brood on the bank of the White Cart at Pollokshaws. In this there is gratifying evidence to the improvement that has been wrought in the condition of that river, which for very many years was in what seemed a hopeless state of pollution.—Herbert Maxwell, Monreith.

Woodcock ringed in Ireland and recovered in Shetland.—On the 7th of July, a wounded Woodcock (*Scolopax rusticola*) was picked up at Skellister, Nesting, Shetland. It had probably struck the telegraph wires, and died shortly after it was found. On its foot was a metal ring endorsed "T. H., Sligo, 4," which was forwarded to me with a request for an explanation. As the bird had evidently been ringed in Ireland, I sent a note of the occurrence to the *Irish Naturalist*, which resulted in my receiving an obliging communication from Mr J. P. Burkitt, advising me to write to Mr H. Bracken, the keeper at Temple House, Ballymote, Co. Sligo. In due course I received the desired information that the bird was marked at Ballymote on the 12th of May 1914, along with three others, and that it was about a fortnight old when ringed. It seems impossible to offer a satisfactory explanation for the presence of this adult Irish-bred Woodcock in Shetland, and at such a very unusual date. It is possible, however, that the presence of the ring may have proved a disturbing element, and caused the bird to act in an erratic manner.—Wm. Eagle Clarke.

Banffshire Molluscan Additions.—I am again indebted to Miss J. Gowan, of Cullen, for additions to the Banffshire list, as follows:—*Pisidium subtruncatum*, numerous examples which Mr J. W. Taylor identifies as this species, some from among beech leaves in a ditch in Crannoch Wood, Cullen, others from a ditch at foot of Bin, Rathven parish, and others from a ditch leading into mill-dam at Cruat's Farm, Portknockie, same parish, all 18th June 1917; *Pisidium pusillum*, a few with *P. subtruncatum*, in a ditch at foot of Bin, Rathven parish, 28th July 1917; *Pupa anglica* from the cliffs at Sunnyside in Fordyce parish, 30th July 1917, one amongst rank herbage and a number amongst wet moss and liverworts; small examples of *Succinea putris* were very numerous, with a few *Limnæa peregra*, in a small weedy stream close to the sea near Cullen; *Succinea elegans*, a few amongst wet moss on the cliffs near the mouth of Glassaugh Burn, Fordyce parish, 3rd August 1917; *Acanthinula lamellata*, several amongst dead beech leaves under ferns in wood at foot of Bin, Rathven parish, 4th August 1917; and *Hygromia granulata* of a rather flat form, several under stones and on walls of ruined cottage near Boyne Castle, Boyndie parish, 6th August 1917.

To her enthusiasm and assiduity we are also indebted for the addition of the following to the Banffshire list: one or two *Planorbis crista*, var. *lævigata*, and a few *Pisidium milium* in a pond in Cullen House grounds, Rathven parish, 24th August 1897; one *Pisidium pulchellum*, one *Vertigo pygmæa*, and a few *Vallonia pulchella* taken in moss on Sandend Links, Fordyce parish, 27th August 1917.

Miss Gowan's work has been most valuable as a contribution to the working out of molluscan distribution in what I regard as an important region from the point of view of northern limits, and I should be glad to have assistance of a similar character from Inverness-shire and all counties north of it.—W. Denison Roebuck, 259 Hyde Park Road, Leeds.

Porcellio lævis, Latr., a Woodlouse new to the Scottish Fauna.—I have recently received this species from Miss Æ. J. Jardine, who collected it in company of *P. rathkii*, Br., and *P. dilatatus*, Br., at Helensburgh, Dumbartonshire. From other members of the genus it may at once be recognised by its comparatively wide and smooth body, the elongated exopodites of the uropoda, the form of the pleural plates of the mesosomatic segments, and to a lesser extent by its colour.—Walter E. Collinge, St Andrews.

Convolvulus Hawk-moth (Sphinx convolvuli) in Wigtownshire.—A specimen of this fine insect was taken in the porch of this house on 7th September and brought to me. It is the first that I have seen or heard of in Wigtownshire. Lepidoptera generally have been unusually abundant this season. Red Admirals are literally in scores on the blossoms of *Buddleia variabilis*, causing one to wonder how they fared for sweets before the late flowering variety—*magnifica*—of this handsome bush was raised by M. Vilmorin in 1893. The type has done flowering before the Admirals appear. I have seen only one Painted Lady, and it is years since I have met with a Peacock butterfly in this county.—HERBERT MAXWELL, Monreith.

Spring Diptera in the Isle of Bute.—Since the records of Bute Diptera are very scanty, it may be of interest to record the following species, taken by myself in the spring of this year. At Kames Bay (N.W. of Rothesay) on 24th April I obtained *Chilosia grossa*, Fln.* (1 ♀); *Platychirus albimanus*, Fab. (1 ♂); *Syrphus lasiophthalmus*, Ztt.* (1 ♀); *Pollenia rudis*, Fab. (2 ♂); *Euphoria cornicina*, Fab. (1 ♀); *Pyrellia eriophthalma*, Mcq.* (4 ♂); *Cyrtoneura pabulorum*, Fln. (1 ♀); *Lonchoptera lutea*, Pz.* (4 ♂ and 3 ♀); and on the beach at Ardbeg Point on the last day of April *Scatophaga litorea*, Fln., was abundant. The 1st of May was spent on the shores of Loch Fad, and the following species were captured: *Bibio laniger*, Mg. (4 ♂); *B. johannis*, L. (in great abundance); *Tipula vittata*, Mg. (1 ♂); *Chilosia pulchripes*, Lw. (4 ♂); *C. grossa*, Fln. (2 ♂ and 1 ♀); *C. fraterna*, Mg.* (2 ♂); *Syrphus lasiophthalmus*, Ztt. (1 ♂ and 4 ♀); *Protocalliphora grœnlandica*, Ztt. (1 ♂); *Pollenia rudis*, Fab. (2 ♂); *Scatophaga stercoraria*, L. (of course abundant); *Hyetodesia lucorum*, Fln. (4 ♂ and 1 ♀); *Anthomyia æstiva*, Mg. (1 ♂); *Ilythea spilota*, Curt.* (one); and *Sciomyza ventralis*, Fln.* (one). Two days afterwards (3rd May), on the roadside between Ardmaleish Point and the northernmost point of the island, I obtained *Bibio laniger*, Mg. (1 ♂); *Eristalis pertinax*, Scop. (1 ♂); *Chilosia grossa*, Fln. (5 ♂ and 2 ♀); *Melangyna quadrimaculata*, Verr.* (6 ♀); *Platychirus discimanus*, Lw.* (2 ♂); *P. albimanus*, Fab. (2 ♂ and 1 ♀); *Syrphus latifasciatus*, Mcq. (1 ♀); *Bombylius major*, L. (2 ♂ and 1 ♀); *Pollenia rudis*, Fab. (3 ♂); *P. vespillo*, Fab. (2 ♂); *Euphoria cornicina*, Fab. (1 ♀); *Pyrellia eriophthalma*, Mcq. (1 ♀); *Scatophaga villipes*, Ztt.* (3 ♂); and *Anthomyia æstiva*, Mg. (1 ♂ and 1 ♀). The ten species marked with an asterisk are, I believe, new records for the Clyde faunal area.—PERCY H. GRIMSHAW, Royal Scottish Museum.

(*Authors are responsible for nomenclature used.*)

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WILD LIFE IN A WEST HIGHLAND DEER FOREST

By William Eagle Clarke, LL.D.

(*Continued from page* 264.)

This instalment affords supplementary information relating to the various forms of wild life already mentioned in the general survey of the Forest. To these have been added a few records of altitudinal range, chiefly of Insects.

The altitudinal ranges have received special attention. They are based upon Ordnance Survey data and determined, in all cases, by the aid of an aneroid barometer, whose accuracy is vouched for by a Kew Observatory certificate—ordinary instruments are usually not sufficiently accurate for special work of this nature.

MAMMALS.

Common Bat or Pipistrelle, *Pipistrellus pipistrellus.*

The occurrence of a Bat amid the wilds of a remote Deer Forest, and at an altitude of 1300 feet, is of considerable interest. Bats have been known at the Lodge for some years, and a pair which came under my notice there on the evenings of the 8th and 19th June 1917, were of this species.

HEDGEHOG, *Erinaceus europæus.*

This species is a resident in the valley zone in the plantations at Ferset (850 feet)—a locality well suited for its presence. About the year 1900, one was captured in a trap set for Weasels on some rough ground, at 1400 feet, adjoining the burn which flows from Ben Alder into the River Ossian. This is the only known occurrence for the subalpine zone, in whose woods, however, it may be present, though not yet detected.

MOLE, *Talpa talpa.*

Abundant on rough land at 1300 feet, at the foot of Loch Ossian—the only ground in the Forest suited to the mode of life of this animal.

COMMON SHREW, *Sorex araneus.*

BRITISH RACE, *S. araneus castaneus.*

I discovered, through the medium of traps, that this species is common in the Lodge gardens at 1300 feet—its highest abode in Scotland, I believe, for which we have reliable data.

[The Lesser Shrew (*Sorex minutus*) is doubtless present and abundant in the Forest, but the nature and extent of the ground it frequents rendered success in trapping practically hopeless. It occurs at the summit of Ben Nevis, whence I have received specimens.]

WILD CAT, *Felis catus.*

A fine specimen was trapped some years ago at the head of Loch Treig. Since then several large cats have been captured, which, though they agreed in colour and markings with the true Wild Cat, were considered by their captors to be examples of the domestic form which had strayed to the hills. These semi-feral animals were trapped principally on Loch Treig side.

FOX, *Vulpes vulpes.*

Very numerous, and has its lairs from 900 feet to a little below the top of Beinn Eibhinn, at about 3500 feet. It is also to be found on the highest tops during winter. The vixen, with cubs, has often been found in the cairn of stones at the summit of Beinn na Lap (3066 feet) when that lair was completely buried under the snow, and was then entered by a tunnel.

STOAT OR ERMINE, *Mustela erminea.*

BRITISH RACE, *M. erminea stabilis.*

Occurs on the highest summits, even in the winter, at which

season *all* assume their white or Ermine dress. Though common generally, it is less so on the high ground.

Weasel, *Mustela nivalis.*

This little carnivore is quite common, and has been trapped at 1730 feet, and higher still at the ruins of an old shieling at 1860 feet. It is not known to occur in the Forest above the altitudes named.

Badger, *Meles meles.*

Was formerly numerous on some rough sandy ground, with knolls and peat-hags, bordering the Blackwater. Only two, however, have been obtained in the Forest since 1891. One of these was bolted by terriers from a cairn, at 1500 feet, at the south end of Amar Strath Ossian.

Otter, *Lutra lutra.*

A few pairs are to be found on Lochs Ossian (1269 feet) and Treig and on the River Ghuilbin. Formerly it frequented Loch na Lap (1930 feet), but it has not been observed there for some years.

Long-tailed Field Mouse, *Apodemus sylvaticus.*

I found this pretty Mouse to be common in the Lodge gardens, at the foot of Loch Ossian, at 1300 feet.

House Mouse, *Mus musculus.*

Occurs in the houses at the foot of Loch Ossian and elsewhere in the Forest.

Brown Rat, *Epimys norvegicus.*

Was very abundant a few years ago about the stables and other buildings at the foot of Loch Ossian, but has been practically exterminated.

Common Field-Vole, *Microtus agrestis.*

Scottish Race, *M. agrestis neglectus.*

This is by far the commonest mammal in the Forest, where evidence of its presence is to be found almost everywhere, except in the gardens, where its place appears to be taken by the Bank-Vole. Its nest was found in the cairn at the summit of Beinn Eibhinn (3611 feet), and its runs and nests were observed to be numerous on the narrow grassy ledges of precipitous rock-faced escarpments. The Scottish race is peculiar to the Highlands.

Red Field-Vole or Bank-Vole, *Evotomys glareolus*.

British Race, *E. glareolus britannicus*.

Appears to be common in the Lodge gardens (1300 feet), where several were captured in traps set for such small game.

Black Water-Vole, *Arvicola amphibius*.

This species is most abundant on the margins of those mountain lochs having peaty margins suited to its subterranean dwellings. It is numerous at Loch na Lap at 1930 feet, and on the sides of Lochan Coire an Lochan at 2450 feet. The English name quoted for this animal is that of the latest authorities, but I am of opinion that this and the Brown Water-Vole are merely dimorphic colour forms of one and the same species. The black form, known as *Arvicola amphibius reta*, chiefly prevails in the Highlands, and is the only one found at Corrour.

Mountain-Hare, *Lepus timidus*.

Scottish Race, *L. timidus scoticus*.

Mountain-Hares are very common in the alpine and subalpine zones, and though they are to be found on the highest summits even in the depth of winter, yet Mr Ferguson informs me that he has never found newly born leverets higher than 2500 feet. As a rule Hares seek the low ground on the approach of a snowstorm, but as soon as the fall is over they return to the alpine zone, though it be under deep snow. Frost and snow do not affect them, but sleet, if prolonged, is fatal. In June I found them not uncommon in the old birch wood and the plantations, and the does bring forth their young there. This species is so abundant that hare-drives have to be organised, in the late autumn, in order to keep its numbers within reasonable bounds.

Rabbit, *Oryctolagus cuniculus*.

The Rabbit is fairly common on the lower ground. Down to the year 1916 a small number frequented some rough rocky slopes, at 2250 feet, near Lochan Coire an Lochan; but here, and elsewhere on the higher ground, they were killed off by the severe snowstorms of the winter named, and do not now occur above 1500 feet.

Red Deer, *Cervus elaphus*.

Scottish Race, *C. elaphus scoticus*.

Red Deer are abundant, over a very wide area, and their total

numbers in the Forest must be very considerable. In summer and during the stalking season they are practically confined to the alpine zone, that is the area over 2000 feet; but in some of the most remote and secluded parts of the Forest, they are to be found at these seasons as low as 1000 feet. Their range in winter depends on the amount of snow, and is usually not above 2000 feet.

Six Western European races of Red Deer are recognised by the latest authorities! The Scottish Red Deer is considered to be distinct from *Cervus elephus atlanticus*, its Norwegian cousin and nearest relative, inasmuch as "there appears to be an appreciable difference in colour between the two races"—not a very convincing statement on which to found a distinctive race.

Roe-Deer, *Capreolus capreolus.*

British Race, *C. capreolus thotti.*

The Roe frequents the wooded glens on Loch Treig side, and a few inhabit the birch wood on Loch Ossian side up to 1700 feet, where they remain throughout the winter, however severe the weather may be. The British Roe only differs from the typical Continental form in being generally darker in colour, especially on the face, which is darker than the body.

BIRDS.

Raven, *Corvus corax.*

Several pairs are natives of the Forest, and remain there throughout the winter, but as they are not numerous at that season, the young of the year must leave. The sites of their nests vary in altitude from 1300 to 2000 feet. One of these is absolutely unapproachable, being situated some distance back in a singular slit-like cave in the face of a cliff. On the 1st of October 1917 Mr Ferguson saw about 150 old and young about Loch Ossian, where they remained for about a week, feeding on the gralloch of deer.

Grey Crow, *Corvus cornix.*

Fairly common and resident. Its nesting sites are on rocky faces, also in trees both in the birch wood and on islands in lochs. In these situations its nesting haunts range from 1300 to 2000 feet. A few pairs remain the winter.

Starling, *Sturnus vulgaris.*

This familiar and widely distributed pastoral bird is only to be

regarded as a rare straggler. During winter and early spring a few have been observed at the foot of Loch Ossian, never more than three in company. The winter visitors were storm-driven wanderers; and those seen in spring may have been returning to haunts from which they had previously been expelled by ungenial weather conditions.

Greenfinch, *Chloris chloris.*

A male, probably a weather-driven vagrant from an agricultural area, appeared after the snowfall of the 4th of December 1915, and remained for a day at the foot of Loch Ossian. This is the only occurrence known to me for the Forest.

House-Sparrow, *Passer domesticus.*

This energetic feathered pioneer has followed the iron road far into the Highlands. It is now a resident at Corrour station, at the summit (1350 feet) of the West Highland Railway. From this lonely outpost it has found its way to the Lodge and the neighbouring premises, where it appeared about the year 1910, and has become quite common. It has not, however, yet reached the old established farmhouse and premises at the head of Loch Treig.

Chaffinch, *Fringilla cœlebs.*

This widely distributed species is both a resident and a summer visitor at Corrour. It is most abundant as a summer visitor to the birch wood, where it nests up to at least 1600 feet, but is also present at that season in the plantations and gardens at the foot of Loch Ossian. Only a very small number remain to winter, and *all* those observed in December 1915 were males. It is also common in summer in the valley zone at the head of Loch Treig and elsewhere.

Redpoll, *Acanthis linaria.*

Lesser Redpoll, *A. linaria cabaret.*

Though somewhat uncommon and local in the Western Highlands, this cheery little bird is both abundant and resident in suitable haunts in the Forest. In the nesting season it is present in the Ossian plantations, including those in the Lodge garden, where none, however, were observed above 1400 feet. In winter the majority betake themselves to, and are then quite common in, the birch wood, where they feed on the seeds of the catkins and

range up to 1700 feet. In the valley zone they are to be found in summer in the wooded ravines and burn sides about Loch Treighead.

Twite, *Acanthis flavirostris.*

The only portion of the Forest in which I have found this moorland summer bird is the low heathery ground, below 1000 feet, about Loch Treighead, where, however, it is not common. It seems to be entirely absent from the moorlands of the sub-alpine zone.

Bullfinch, *Pyrrhula pyrrhula.*

British Race, *P. pyrrhula pileata.*

The British Bullfinch is resident in the Lodge gardens and neighbouring pine plantations, and in the birch wood. In these haunts it is common, but it does not appear to occur above 1400 feet.

Reed-Bunting, *Emberiza schœniclus.*

A few pairs are summer visitors to marshy haunts at the foot of Loch Ossian at 1300 feet, and on Loch Treig side at 800 feet. In 1916 it was first observed at its nesting quarters at Loch Ossian on the 6th of April.

Snow-Bunting, *Plectrophenax nivalis.*

Chiefly a common winter visitor, but has occasionally been observed in early autumn on the higher ground in the Forest. It may possibly nest amid the mountains of the Corrour Forest; but though I devoted much time in searching for it in June 1917, no success attended my efforts. It is, however, known to nest not far off, and birds seen in August may have been emigrants from a neighbouring Forest. In the depth of winter it has been sometimes observed in numbers as high as 3000 feet. In spring it lingers until about mid-April.

Skylark, *Alauda arvensis.*

The very few Skylarks that are natives of the Forest are veritable "birds of the wilderness," for they are to be found on wild moorland ground, and at from 1200 to 1350 feet. It is one of the rarest of the Corrour birds, for at most three pairs, and sometimes only two, seek these solitudes for summer haunts. On 7th December 1915 a waif appeared during a strong westerly gale with snow and rain, but it only remained for the day.

Pied Wagtail, *Motacilla lugubris.*

A few pairs are summer visitors to the subalpine and valley zones It nests annually in the Lodge garden, and occasionally at Loch na Lap at 1940 feet, and also on the banks of the burn running out of that loch at 1860 feet—both remarkable altitudes for breeding haunts of this species. It is more frequently observed on the lower ground about Loch Treig side. Immigrants, for the summer, have been observed at Loch Ossian (1269 feet) as early as the 2nd of March.

Grey Wagtail, *Motacilla boarula.*

This species seems to be a summer visitor to the valley zone only, where it nests on the margin of Loch Treig at 800 feet, and on its tributary streams up to an altitude of about 1000 feet.

Tree Pipit, *Anthus trivialis.*

This is one of the interesting summer visitors which annually seek the Ossian woods. In these it is fairly common, especially among the birches, where it nests up to 1550 feet.

Meadow Pipit, *Anthus pratensis.*

This is the most alpine, wide-ranging, and abundant of the small birds found in the Forest. It occurs, as a summer visitor, from the low ground (700 feet) to the summit of Beinn Eibhinn (3611 feet), the highest of the Corrour mountains. It is also found on moorland ground, some of which is little more than desolate morass. In 1916 it appeared on Loch Ossian side on the 5th of April.

Tree-Creeper, *Certhia familiaris.*

British Race, *C. familiaris britannica.*

Not uncommon, and resident in the birch wood, where it ranges and nests up to at least 1550 feet. It has not been observed elsewhere in the Forest.

Great Titmouse, *Parus major.*

British Race, *P. major newtoni.*

Judged by its numbers, this is one of the rarest of the Forest birds. It is probably only a recent colonist at Corrour, for its presence was not detected there until December 1915, when a pair was observed in the birch wood feeding on the seeds or insects

afforded by the catkins. In June 1917, I observed both parents accompanied by their brood at 1500 feet. This species is scarce and very local in its distribution in the West Highlands, and its presence in the wilds of the Corrour Forest is noteworthy.

Coal Titmouse, *Parus ater.*

British Race, *P. ater britannicus.*

The commonest woodland-bird found in the Forest. In the birch wood it is especially abundant, and from this source is rapidly colonising the extensive pine plantations. In the former haunt it occurs commonly up to the limit of trees—1600 to 1700 feet. In the valley zone it is frequent in the wooded ravines on Loch Treig side.

Blue Titmouse, *Parus cæruleus.*

British Race, *P. cæruleus obscurus.*

Resident in very limited numbers in the subalpine zone, where it occurs in the Ossian woods up to 1500 feet, and also in the Lodge gardens. In the valley zone, it is also to be observed among the trees at the head of Loch Treig.

Lesser Whitethroat, *Sylvia curruca.*

A male in full song proclaimed its presence, and was observed at close quarters, in some dense bushes at the head of Loch Treig, on the 13th of June 1915. Though sought for on several occasions later, it was not seen again. Its occurrence at this season amid a region of such high mountains must be regarded as quite exceptional. It is a scarce breeding bird in Scotland.

Willow Warbler, *Phylloscopus trochilus.*

The chief haunt of this very familiar summer bird is the Ossian birch wood, where it is quite abundant and is to be seen, and more often heard, up to the limit of trees (1600-1700 feet). It is also fairly abundant in the gardens and plantations on the side of the Loch; and at least a pair resort annually to the very few trees which fringe the railway at Corrour station (1350 feet)—a tiny oasis amid extensive moorlands. It is present, too, on the wooded sides of the burns of the valley zone on Loch Treig side.

Wood Warbler, *Phylloscopus sibilatrix.*

The presence of this species is one of the most interesting features of the avifauna of the Corrour Forest. Each year a small number pass the summer in the old wood, seeking those spots where

the birches are tallest, and from their topmost branches they utter those singular sibilous notes which so much interested Gilbert White 150 years ago. Here the species probably reaches its highest altitudinal breeding range in the British Isles, namely 1350 to 1550 feet.

Song Thrush, *Turdus musicus.*

British Race, *T. musicus clarkei.*

A summer visitor, in limited numbers, to the subalpine and valley zones. In the former it nests in the plantations and gardens on the margin of Loch Ossian at 1350 feet; and on the lower ground in the wooded burn-sides and glens about the head of Loch Treig, at from 800 to 1000 feet. In the spring of 1916 it had returned to its summer haunts at Loch Ossian on the 18th of March—an early date for its appearance in such an elevated region.

Fieldfare, *Turdus pilaris.*

This British winter bird appears, sometimes in considerable numbers, in October and in November, on its arrival in our islands from Northern Europe. It frequents, for a time, heathery and grassy ground at the foot of Loch Ossian (1300 feet), but departs on the advent of severe weather. During December 1915 three remaining birds were driven away by the snowstorm of the 4th. Return movements northwards are recorded from the 24th of April to the 1st of May.

Blackbird, *Turdus merula.*

A recent colonist, but now a resident in small numbers in the gardens and plantations at the foot of Loch Ossian at 1275 to 1350 feet. It first made its appearance in the Lodge gardens in the spring about the year 1908. In these haunts it passes the winter, and does not appear to be affected by severe cold, nor to be more numerous in the winter than in the nesting season. It seems to be entirely absent, however, from the more sparsely wooded country of the valley zone.

Ring Ouzel, *Turdus torquatus.*

A summer visitor to the many suitable nesting quarters afforded by the rocky ground, crags, rough heathery slopes, and by the steep burn-sides. In such situations it is to be found at altitudes ranging from 1000 to 3000 feet. In 1916 the first bird of the season was observed on the 24th of April.

(*To be continued.*)

THE CONVOLVULUS HAWK-MOTH IN SCOTLAND

THE present year has witnessed the influx of a large number of specimens of *Sphinx convolvuli*, Linn., the Convolvulus Hawk-moth, into all parts of the British Isles. Many captures and notes of occurrence have been reported to us, while others have been recorded in the daily press and (as regards England especially) in certain of our entomological contemporaries, proving that the year 1917 will take its place with others, such as 1846, 1868, 1875, 1885, and 1887, as one of the more important "immigration" seasons, when vast numbers arrive in this country from abroad, having faced the perils of a journey across the Channel or the North Sea.

As the actual records of this fine species are either unpublished, or, if published, scattered in the columns of local newspapers, etc., it is desirable that they should be gathered together and placed in a more definite and permanent form, while the same remark applies to those which have been personally reported to us. We have, therefore, arranged below all the occurrences known to us in some sort of order, and trust that the *ensemble* will be useful to the lepidopterist now and henceforth.

The following records are arranged under counties, in the sequence followed by the Watsonian scheme, and as regards those furnished to us by correspondents, we follow as closely as possible their own words. We take the opportunity of thanking our contributors, whose names are appended to the various notes, for the information supplied by them.

KIRKCUDBRIGHT.—Mr James M'Cargo, of Kirkpatrick-Durham, forwarded a specimen for identification, on 10th September, with the remark that it was "got in this district last week."

WIGTOWN.—A note by Sir Herbert Maxwell on the occurrence of a specimen at Monreith on 7th September was published in our November number (p. 278). In a further letter the same observer writes: "Another specimen was picked up in the street of Newton Stewart, killed, apparently, by flying against a window."

BERWICK.—A correspondent in *The Scotsman* of 8th September reports a considerable number in the neighbourhood of Berwick, two at Berwick and others at Scremerston.

We are also informed by Mr Bishop, of Berwick, that at least half a dozen specimens were brought to him during September.

HADDINGTON.—An example captured at Prestonkirk was sent by Mr Alex. Macdonald to the Royal Scottish Museum for identification on 17th September.

Miss Balfour, of Whittingehame, had one sent to her which was found alive on a road close to East Linton at the end of August, and she has kindly drawn our attention to notes in the *Haddingtonshire Courier*, from which it appears that two were captured and another seen at Haddington during September.

EDINBURGH.—Captain K. C. Crosbie, M.C., informs us that a male example was caught by a gardener in the grounds of West House Asylum, Edinburgh, at the end of July.

From Miss Balfour, Whittingehame, we learn of one having been caught at Prestonhall, Midlothian, in the first week of September.

LINLITHGOW.—A note published by Geo. C. Griffiths, in the November number of *The Entomologist*, records the occurrence of two specimens on 3rd September, on the window of the railway station at Bo'ness.

PERTHSHIRE.—We have received the following interesting note from Mr Henry Coates, Curator, The Natural History Museum, Perth:—

"During the last week of August and first two weeks of September, nine specimens of the Convolvulus Hawk-moth, *Sphinx convolvuli*, were sent to me at the Museum, eleven were reported to me within the same period, and three in October. These twenty-three specimens were all got in Perthshire, and were from such widely-scattered districts as Blair Atholl (3), Strathbraan (1), Murthly (1), Blairgowrie (1), Coupar-Angus (1), Almondbank (2), Perth (10), Barnhill (1), Glenshee (1), and Struan (2). Most of them seem to have been taken in gardens. The Convolvulus Hawk-moth

is, in most seasons, a distinctly rare species in Perthshire, but in certain seasons, separated by long intervals, it makes its appearance in considerable abundance. The present is evidently a 'Convolvulus year.'"

In the same county Mr J. M'L. Marshall informs us that he saw a specimen on 7th September at Bleaton Hallett, near Blairgowrie, at about 900 feet above sea-level; and a female in Mr J. W. Bowhill's possession was obtained at Fortingal on 6th September.

FORFAR.—Mr Kenneth J. Morton has received a specimen which was captured at Barnhill, near Broughty Ferry, early in September.

KINCARDINE.—In *The Scotsman* of 17th September three specimens were reported from the neighbourhood of Fordoun during the last week of August and the first week of September.

ABERDEEN.—A specimen was picked up from a flower-bed at Culter, on 2nd September, by Mr Duncan Cumming, V.S.

Specimen reported from Aberdeen (*Scotsman*, 17th September).

INVERNESS.—A male got at Loch Eilt on 23rd August was sent to Mr J. W. Bowhill; and an example reported in *The Scotsman* of 2nd October from Drumnadrochit was captured on 3rd September.

ARGYLL.—Miss Balfour, Whittingehame, informs us that she has been given a specimen which was found dead on a path at Inveraray, in September.

ROSS-SHIRE.—An example was reported in *The Scotsman* of 29th September, from Dingwall, captured shortly before the 26th of that month.

CAITHNESS.—A correspondent, writing from Wick to *The Scotsman* (11th October), states that the species was very common in the county this season, and that specimens had been obtained at John O'Groats and at least as far south as Lybster.

OUTER HEBRIDES.—According to a correspondent in *The Scotsman* of 11th October, an example was taken this season in a garden at Stornoway.

ORKNEYS.—As reported in *The Scotsman* of 3rd October, a specimen was captured at Papa Westray during the last week of September.

SHETLANDS.—Mr W. Fotheringham, Lerwick, writes us as follows:—"This year the Convolvulus Hawk-moth was very plentiful in the north. We had an enormous number in Shetland."

Dr T. Edmondston Saxby, Halligarth, Balta Sound, kindly sent two specimens, accompanied by the following remarks:—"26th August 1917. By same post I am sending you a large moth which I take to be the 'Convolvulus' Moth, caught in the honeysuckle on the front of our house at 8.15 P.M. G. M. T. (not summer time), yesterday by my brother, Captain S. L. Saxby." "27th August 1917. This specimen [the second one sent] caught at Quoyhouse, Unst, on Saturday night, and brought over to me to-day, is one of many which have been seen and captured during the last few days. I hear of five which have been caught, and I've seen three of them, all the same kind."

Migration by River.—Migration manifests itself in many forms. One that we had hitherto not had the opportunity of observing was the method by which young duck travel from the inland places, where they have been bred, towards the sea.

While at Aberfoyle from 6th to 13th August we had the chance of seeing a movement of this kind. There were several thunderstorms on 11th August, accompanied by heavy rain which lasted till midday on the 12th, and on this latter day the rivers were running very big. On the swollen waters of the Duchray and the Laggan parties of duck were travelling down-river; we saw young Mallard almost fully feathered, and family parties of Goosander and Merganser, the young being still in down with feathers just beginning to show. They travelled steadily down stream, though sometimes stopping in the back-waters or making their way on to the grassy banks. They were not being carried away by the water: when frightened they could turn and swim against the current, even where it was heaviest. All day they were passing in small numbers, and on other days when the waters were lower the movement was noted on a much smaller scale.—LEONORA JEFFREY RINTOUL and EVELYN V. BAXTER, Largo.

Note on the Water Vole.—While a boy was digging potatoes at Elgin in August last, a brown Water Vole (*Arvicola amphibius*) came up out of the ground, where it had been working like a mole, throwing up heaps of soil. The situation in which it was found is quite half a mile from any of the ditches in which I frequently see the black Water Vole. This is the first brown example of this rodent I have found here.—William Ogg, Elgin.

Note on the Singular Nesting of the Tree Creeper.—This summer four pairs of Tree Creepers (*Certhia familiaris*) nested *simultaneously* and reared their broods in safety in a small toolshed adjoining my garden at Stenton, near Dunkeld. The dimensions of this shed, which is open in front, are 10 ft. by 8 ft., and the nests were built between the boards forming the back and sides and the four corner posts, which are the mainstay of the little building. I may say that these birds are abundant in the wood which almost adjoins the garden.—Gladys Esmé Graham Murray, Stenton.

Spoonbill in the Outer Hebrides.—On the 6th of October a Stornoway shore-shooter brought me a Spoonbill (*Platalea leucorodia*) which he had shot on the muddy flats on the shore of Broadbay. As the bill was only 6 ins. long at the culmen, the specimen was probably a bird of the year. This is the first time I have known this bird to have occurred in the Island of Lewis.—Donald Mackenzie, Stornoway.

[We believe this to be the first known occurrence of the Spoonbill in the Outer Hebrides.—Eds.]

Occurrence of the Cuckoo Ray in Forth.—Records of the Cuckoo Ray (*Raia circularis*) in the Firth of Forth are not common. In the *Annals of Scottish Natural History* (1900, p. 204) three examples, recorded in the *Report of the Scottish Fishery Board for* 1893 *and* 1894, are referred to by Dr Eagle Clarke from this area, and we have not been able to find any subsequent note of this fish in Forth. We therefore think it worth recording that one was cast ashore in Largo Bay on 27th May 1917. It was identified at the Royal Scottish Museum as belonging to this species; it was $23\frac{3}{4}$ inches long and 14 across the disc; the lateral spots showed distinctly. A small Thornback Ray (*Raia clavata*) was found lying near the Cuckoo Ray.—Evelyn V. Baxter and Leonora Jeffrey Rintoul, Largo.

The Spiny Crossfish (Asterias glacialis, Linn.) in Orkney.—A typical and well-grown example of this species, easily distinguished from *Asterias muelleri* by the absence of pedicellariæ on the spines next the tube feet, has been forwarded by Mr J. Bain, from Orkney. The specimen is of good size, over 10 inches from tip to tip of its arms, the radius of the disc being 13 mm. and the length of a ray 135 mm. The rays were full of well-developed ova. The specimen was caught in a lobster-pot, off Swona, South Ronaldshay, Orkney, on 5th June 1917 by the fishermen, who state that they have never seen a similar starfish. So far as I know, this is the first instance of its occurrence in Orkney, though a specimen from the Pentland Firth has already been recorded by me in *The Scottish Naturalist* (1913, p. 237). These records tend to show that this creature, which is common on the western coast, is regularly distributed further to the east than was supposed, and indicate that it belongs to the considerable group of animals, among them the Rock Lobster, *Palinurus vulgaris*, which inhabit the Atlantic coasts of Britain, but have never succeeded in penetrating to or establishing themselves in the North Sea.—James Ritchie, Royal Scottish Museum.

Planorbis albus and P. contortus in Banffshire and Aberdeenshire South.—Miss J. Gowan of Cullen, to whom I have recently been indebted for much assistance in regard to the mollusca of that neighbourhood, has sent numerous examples of *Planorbis albus* and a few small ones of *P. contortus*, taken in a pond in Cullen House grounds, in the parish of Rathven, 13th June. She also sent the same two species, one of the former, and the latter very numerous, found on stones in the Loch of Aboyne, Aberdeenshire South, 2nd July 1917, this loch being 400 ft. above sea-level. These are fresh authentications for the respective vice-counties 94 and 92, and are valuable contributions to the working out of the range of freshwater shells in northern Scotland.—W. Denison Roebuck, 259 Hyde Park Road, Leeds.

Milax gagates in Stirlingshire.—I have had the pleasure of receiving from a fresh correspondent, Mr George Nelson, of Falkirk, a few slugs collected in his garden at 38 Griffiths Street, 26th September 1917. These are a very characteristically marked example of *Limax maximus* var. *cellaria*, one of *Agriolimax agrestis* var. *reticulata*, and *Milax gagates* var. *rava*, the last-named being quite a new authentication for the county of Stirling. He has also sent various shells from the Union Canal.—W. Denison Roebuck, 259 Hyde Park Road, Leeds.

The Woodlice of Dumbartonshire.—As illustrating what careful and systematic collecting will accomplish, I should like to bring the following instance to the notice of Scottish naturalists.

Up to the commencement of 1917 only eight species of Woodlice had been recorded from the county of Dumbartonshire, viz., *Trichoniscus pygmæus*, G. O. Sars; *T. roseus* (Koch); *Trichoniscoides albidus* (Budde-Lund); *Haplophthalmus mengii* (Zaddach); *Oniscus asellus*, Linn.; *Porcellio scaber*, Latr.; *P. pictus*, Brandt; and *Cylisticus convexus* (De Geer).

On 24th April I received from Miss Æ. J. Jardine, from Helensburgh, a small collection of these interesting crustacea, and since then five further collections have followed, which have resulted in adding eleven further species to the county list, and three of these are additions to the Scottish fauna. The complete list for the county is now as follows:—

Trichoniscus pusillus, Br.; *pygmæus*, G. O. Sars; and *roseus* (Koch).
Trichoniscoides albidus (B.-L.), and *sarsi*, Patience.
Haplophthalmus mengii (Zadd.), and *danicus*, B.-L.
Oniscus asellus, Linn.
Philoscia muscorum (Scopoli).
Cylisticus convexus (De Geer).
Porcellio scaber, Latr.; *pictus*, Br.; *dilatatus*, Br.; *rathkii*, Br.; *ratzeburgii*, Br.; and *lævis*, Latr.
Porcellionides pruinosus (Br.).
Platyarthrus hoffmannseggii, Br.
Armadillidium vulgare (Latr.).

The total number of species recorded for Scotland is twenty-three. The species not yet found by Miss Jardine are *Ligia oceanica* (Linn.), a maritime species; *Trichoniscus spinosus*, Patience, and *T. stebbingi*, Patience; and *Philoscia couchii*, Kinahan, the latter also a maritime species.

There is no reason to suppose that the county of Dumbarton is any richer in species than others, and I shall be very pleased to hear from anyone willing to work out the distribution in other counties, especially those of Caithness, Sutherland, Ross and Cromarty, Inverness, Nairn, Elgin, and Banff.—Walter E. Collinge, The University, St Andrews.

P.S.—Since writing the above I have received from Mr William Evans examples of *Ligia oceanica* from the shore at Peaton, east side of Loch Long, Dumbartonshire.

LIBRARY

Triphyllus punctatus, Fab., in Scotland.—On the 22nd September, while collecting in Cadzow High Park, Hamilton, I came upon colonies of *Triphyllus punctatus*, F., feeding upon the "beef steak" fungus on the oak trees. I cannot find that this beetle has been taken in Scotland before. The Rev. Canon Fowler gives Scarborough and Dunham Park, Manchester, as the most northerly localities from which it has been recorded.—James J. F.-X. King, F.E.S.

Aradus corticalis, L., in Scotland.—Toward the end of June, during July and August, I took a number of larvæ, pupæ, and imagos of *Aradus corticalis*, L., on a dead birch tree in the Black Wood, Rannoch. Most of the specimens which I took were walking or resting among the lichens which covered the tree; very few were seen under the bark. I brought home to Glasgow some larvæ, and these developed in due course during September. Neither the species nor genus has been reported from Scotland. Saunders gives New Forest, West Wickham, Kent, and Parley Heath as localities, mentioning it as being rare under bark.—James J. F.-X. King, F.E.S.

BOOK NOTICE.

The Problem of Pain in Nature. By Charles F. Newall. Paisley: Alexander Gardner, 1917. 131 pages. Illustrated. Price 3s. 6d. net.

There has always been a tendency in man to judge animal life and expressions from the standpoint of his own experiences and sensations, and in recent years this tendency has been fostered especially by a school of American writers, who have habitually translated animal life-histories into supposed human equivalents. This method may add the interest of the novel, but it leads the reader far from the path of actual truth. Mr Newall's book will be useful in checking this false science, as well as in performing the purpose for which it was written—to solve the apparent antagonism between the "tender mercy" which rules the world and the seeming cruelty of nature's own struggles and processes. By examples gathered from many sources, the author shows that pain in the lower animals is by no means of the same degree as pain in the human race: that, indeed, the phrase "cruelty of nature" has arisen mainly through a fundamental misunderstanding of the functions and nervous reactions of the lower creatures. The book presents the somewhat technical facts of the matter in a way which cannot fail to appeal to the intelligent reader.—J. R.

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